2. Product specification and feature

2.1 Product Specifications

Specfications are correct at the time of printing. Product specifications are subject to change without notice. See below for product specifications.

2.1.1 Product Overview

1) Key Feature

  ○ Speed
   - 16ppm B&W, 4ppm color print / copy

  ○ Consumables
   - Black toner (2K sheet)
   - CMY toner (1K sheet)

  ○ Paper handling
   - 1sheet Manual slot, 150 sheet Semi-cassette, 250 sheet cassette option

  ○ Interface
   - USB 2.0, Ethernet 10/100 Base TX, USB host (PictBridge)

2) Concept

  ○ Small size Color laser MFP(A4 Color laser MFP)

  ○ Target user
   - Small office & small business
   - CLX-3160N (3in1, SPL)
   - CLX-3160FN (4in1, SPL)

  ○ Black only printing function

  ○ Auto warning sheet

  ○ USB host function
   - PictBridge
   - Scan to USB memory, direct printing

2.1.2 Product General Specifications

2.1.2.1 General Print Engine

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Engine Speed	Simplex	Up to 16 ppm in A4 black (17 ppm in Letter) Up to 4 ppm in A4 color (4 ppm in Letter)	Up to 16 ppm in A4 black (17 ppm in Letter) Up to 4 ppm in A4 color (4 ppm in Letter)
	Duplex	N/A	N/A
Warmup time		Less than 35 sec	Less than 35 sec
FPOT (B&W)	From Ready	Less than 14 sec	Less than 14 sec
	From Idle	Less than 45 sec	Less than 45 sec
	From Coldboot	Less than 45 sec	Less than 45 sec
FPOT (Color)	From Ready	Less than 26 sec	Less than 26 sec
	From Idle	Less than 57 sec	Less than 57 sec
	From Coldboot	Less than 57 sec	Less than 57 sec
Resolution	Optical	600 x 600 dpi	600 x 600 dpi
	Support	MAX: 2400 x 600 dpi class, 1200 x 600 dpi (default), 600 x 600 dpi(Color & B&W)	MAX: 2400 x 600 dpi class, 1200 x 600 dpi (default), 600 x 600 dpi(Color & B&W)

2.1.2.2 Controller & S/W

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
MPU		Samsung CHORUSm 300MHz	Samsung CHORUSm 300MHz
Memory	Std.	128 MB	128 MB
	Max.	128 MB	128 MB
Memory Expansion		N/A	N/A
Printer Languages		SPL-C (Samsung Printer Language Color)	SPL-C (Samsung Printer Language Color)
Fonts		Windows fonts	Windows fonts
Printer driver	Supporting OS	[Windows] - Windows 98/Me/2000/XP - In box N/A	[Windows] - Windows 98/Me/2000/XP - In box N/A
		[Linux] - RedHat 8.0 ~ 9.0 - Fedora Core 1~4 - Madrake 9.2 ~ 10.1 - SuSE 8.2 ~ 9.2 - (Smart panel N/A)	[Linux] - RedHat 8.0 ~ 9.0 - Fedora Core 1~4 - Madrake 9.2 ~ 10.1 - SuSE 8.2 ~ 9.2 - (Smart panel N/A)
		[Mac] - Mac OS 10.3~10.4 - (Mac OS 9 N/A) - (Smart panel N/A)	[Mac] - Mac OS 10.3~10.4 - (Mac OS 9 N/A) - (Smart panel N/A)

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
	Default Driver	SPL-C (Samsung Printer Language Color)	SPL-C (Samsung Printer Language Color)
	WHQL	Windows 2000/XP	Windows 2000/XP
	Language Localization	[Windows] : Korean, English, French, German, Italian, Spanish, Russian, Dutch, E.Portuguese, B.Portuguese, Finish, Swedish, Norwegian, Danish, S.Chinese, T.Chinese, Polish, Hungarian, Czech, Turkish, Greek [Mac] : English, French, German, Italian, Spanish, Korea [Linux] : English only	[Windows] : Korean, English, French, German, Italian, Spanish, Russian, Dutch, E.Portuguese, B.Portuguese, Finish, Swedish, Norwegian, Danish, S.Chinese, T.Chinese, Polish, Hungarian, Czech, Turkish, Greek [Mac] : English, French, German, Italian, Spanish, Korea [Linux] : English only
Scan driver	TWAIN	Yes	Yes
	WIA	Yes(Win XP only)	Yes(Win XP only)
Application	Network Scan (Client)	Yes (multi-folder)	Yes (multi-folder)
	PC-FAX	N/A	Yes(Mono Send only, Included in SmarThru4)
	PSU	USB only	USB only
	Status Monitor or Virtual panel	USB / Network, Default Install	USB / Network, Default Install
	Network Management	Set IP, SWAS & SWS(Linux, Mac Not support SWAS & SWS Iexplorer 5.0 or higher)	Set IP, SWAS & SWS(Linux, Mac Not support SWAS & SWS Iexplorer 5.0 or higher)
	SmarThru	SmarThru 4	SmarThru 4
Interface			
Parallel		N/A	N/A
USB		USB 2.0, USB host 1.1 (Scan to USB, Direct print)	USB 2.0, USB host 1.1 (Scan to USB, Direct print)
Network		Ethernet 10/100 Base TX	Ethernet 10/100 Base TX
Wireless		N/A	N/A
Network Interface			
Protocol		TCP/IP, IPP, SNMP V2	TCP/IP, IPP, SNMP V2
User Interface			
LCD		2 line LCD (China, Korea : Graphic LCD)	2 line LCD (China, Korea : Graphic LCD)
OP UI		OP UI Guide 2.0	OP UI Guide 2.0

2.1.2.3 Scan

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Scan method		Color CCD	Color CCD
Scan Speed	Linearity, Halftone	15 Sec(300dpi,USB2.0,P4 3.0GHz,512M)/Ltr	15 Sec(300dpi,USB2.0,P4 3.0GHz,512M)/Ltr
	Gray	20 Sec(300dpi,USB2.0,P4 3.0GHz,512M)/Ltr	20 Sec(300dpi,USB2.0,P4 3.0GHz,512M)/Ltr
	Color	30 Sec(300dpi,USB2.0,P4 3.0GHz,512M)/Ltr	30 Sec(300dpi,USB2.0,P4 3.0GHz,512M)/Ltr
Resolution	Optical	600 x 1200dpi	600 x 1200dpi
	Enhanced	4800dpi x 4800dpi	4800dpi x 4800dpi
Halftone		256levels	256levels
Scan Size	Max. Document Width	Max.216mm(8.5inch)	Max.216mm(8.5inch)
	Effiective Scan Width	Max 208mm(8.2inch)	Max 208mm(8.2inch)
Scan Depth	Color	24bits	24bits
	Mono	- 1bit for Linearity & Halftone - 8Bits for Gray scale	- 1bit for Linearity & Halftone - 8Bits for Gray scale
Compatibility		[Windows] - Windows 98/Me/2000/XP [Linux] - RedHat 8.0 ~ 9.0 - Fedora Core 1~4 - Madrake 9.2 ~ 10.1 - SuSE 8.2 ~ 9.2	[Windows] - Windows 98/Me/2000/XP [Linux] - RedHat 8.0 ~ 9.0 - Fedora Core 1~4 - Madrake 9.2 ~ 10.1 - SuSE 8.2 ~ 9.2

2.1.2.4 Copy

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Copy Speed	Simplex Copy Speed	@SDMC up to 16 cpm in A4 black (17 cpm in Letter)Up to 4 cpm in A4 color (4 cpm in Letter)	@SDMC up to 16 cpm in A4 black (17 cpm in Letter)Up to 4 cpm in A4 color (4 cpm in Letter)
	Duplex Copy Speed	N/A	N/A
FCOT (B&W)	From Ready	Less than 18 sec	Less than 18 sec
	From Idle	Less than 50 sec	Less than 50 sec
	From Coldboot	Less than 50 sec	Less than 50 sec
FCOT (Color)	From Ready	Less than 36 sec	Less than 36 sec
	From Idle	Less than 75 sec	Less than 75 sec
	From Coldboot	Less than 75 sec	Less than 75 sec
Zoom Range		25% to 400% for Platen 25% to 100% for ADF	25% to 400% for Platen 25% to 100% for ADF
Multi Copy		1~99	1~99
Preset		[Original(100%)] [A4 → A5(71%)] [LGL → LTR(78%)] [LGL → A4(83%)] [A4 → LTR(94%)] [EXE → LTR(104%)] [A5 → A4(141%)] 25%, 50%, 150%, 200%, 400% [Custom: 25-400%)]	[Original(100%)] [A4 → A5(71%)] [LGL → LTR(78%)] [LGL → A4(83%)] [A4 → LTR(94%)] [EXE → LTR(104%)] [A5 → A4(141%)] 25%, 50%, 150%, 200%, 400% [Custom: 25-400%)]
Original Type	Text	Scan: 600x300dpi , Printing : 600x600dpi	Scan: 600x300dpi , Printing : 600x600dpi
	Text/Photo	Scan: 600x300dpi , Printing : 600x600dpi	Scan: 600x300dpi , Printing : 600x600dpi
	Photo	Platen) Scan : 600x600dpi, Printing : 1200x1200dpi ADF) Scan : 600x300dpi, Printing : 600x600dpi	Platen) Scan : 600x600dpi, Printing : 1200x1200dpi ADF) Scan : 600x300dpi, Printing : 600x600dpi
Automatic Background Suppression		Yes(Mono Only)	Yes(Mono Only)
Darkness Control		3 level	3 level
Collation Copy		Yes(ADF Only), flushing if Memory full	Yes(ADF Only), flushing if Memory full
Special Copy	ID Card Copy	Yes(Platen Only)	Yes(Platen Only)
	Auto fit	Yes(Platen Only)	Yes(Platen Only)
	Margin Shift	No	No
	Book Copy	No	No
	Auto Suppression	No	No
	Covers	No	No
	Transparencies	No	No
	Create Booklet	No	No
	N-up copy	2-up, 4-up (ADF only)	2-up, 4-up (ADF only)
	Clone	Yes (Platen Only)	Yes (Platen Only)
	Poster	Yes(Platen Only, x9 Only)	Yes(Platen Only, x9 Only)

2.1.2.5 Fax

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Compatibility		N/A	ITU-T G3
Communication System		N/A	PSTN/PABX
Modem Speed		N/A	33.6Kbps
TX Speed		N/A	3sec
Compression		N/A	MH/MR/MMR/JBIG/JPEG
Color Fax		N/A	Default (But Memory Transmission & Any Reserved Transmission are not supported.)
ECM		N/A	Yes
Resolution	Std	N/A	203x98dpi
	Fine	N/A	203x196dpi
	S.Fine	N/A	300x300dpi
Scan speed	Std	N/A	3sec/LTR (ADF)
	Fine	N/A	5sec/LTR (ADF)
	S.Fine	N/A	6sec/LTR (ADF)
Multiple page scan speed		N/A	20 ppm/LTR
Telephone Features	Handset	N/A	No
	On hook Dial	N/A	Yes
	Search	N/A	Yes(Phone Book)
	1-Touch Dial	N/A	30
	Speed Dial	N/A	240 locations
	TAD I/F	N/A	Yes
	Tone/Pulse	N/A	Selectable in Tech Mode
	Pause	N/A	Yes
	Auto Redial	N/A	Yes
	Last Number Redial	N/A	Yes
	Distinctive Ring	N/A	Yes
	Caller ID	N/A	No
	External Phone Interface	N/A	Yes
Functions	Mail Box	N/A	No
	Voice Request	N/A	No
	TTI	N/A	Yes
	RTI	N/A	Yes
	Polling	N/A	No
	Earth/Recall	N/A	No
	Auto Reduction	N/A	Yes
	SMS	N/A	No
	RDC	N/A	Yes

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Report & List Print out	Tx/Rx Journal	N/A	Yes
	Confirmation	N/A	2 types available (with Image TCR, w/o image TCR)
	Auto Dial List	N/A	Yes
	System Data List	N/A	List all user setting
Sound Control	Ring Volume	N/A	Yes(Off,Low,MED,HIGH)
	Key Volume	N/A	Yes(On,Off)
	Speaker	N/A	Yes(On,Off)
	Alarm Volume	N/A	Yes(On,Off)
Junk Fax barrier		N/A	Yes
Security Receive		N/A	Yes
Battery Backup		N/A	Yes (Up to 43 hours target)
Rx fax duplex print out		N/A	No
Receive Mode		N/A	Fax, TEL, Ans/Fax
Capacity		N/A	4MB(320 Pages, Mono)
Optional Memory		N/A	No
Max locations to store to 1 Group Dial		N/A	240 locations
Fax Forward to FAX		N/A	Yes(On/Off), both Sent and Received
Fax Forward to e-mail		N/A	No
Broadcasting		N/A	up to 249 locations
Cover page		N/A	No
Delayed fax		N/A	Yes (Tx only, Mono only)
Memory RX		N/A	Yes
Mail Box (Electronic)		N/A	No
Voice Request		N/A	No
TTI		N/A	Yes
RTI		N/A	Yes
Polling		N/A	No
Earth/Recall		N/A	No
Auto Reduction		N/A	Yes (On,Off)

2.1.2.6 Paper Handling

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Standard Capa.		150-sheet Semi Cassette Tray	150-sheet Semi Cassette Tray
Max. Capa.		400 sheets @75g/$_{m^2}$	400 sheets @75g/$_{m^2}$
Printing	Max. Size	216 x 356mm (8.5" x 14")	216 x 356mm (8.5" x 14")
	Min. Size	76 x 127 mm (3" x 5")	76 x 127 mm (3" x 5")
	Margin(T/B/L/R)	4 mm, 4 mm, 4 mm, 4 mm	4 mm, 4 mm, 4 mm, 4 mm
Multi-purpose tray			
Capacity		1 sheet	1 sheet
Media sizes		76 x 127 mm (3" x 5") ~ 216 x 356 mm (8.5" x 14")	76 x 127 mm (3" x 5") ~ 216 x 356 mm (8.5" x 14")
Media type		Plain Paper, Thick Paper, Thin Paper, Bond Paper, Color Paper, Card Stock, Labels Transparency, Envelope, Preprinted Cotton,Recycled Paper, Archive	Plain Paper, Thick Paper, Thin Paper, Bond Paper, Color Paper, Card Stock, Labels Transparency, Envelope, Preprinted Cotton,Recycled Paper, Archive
Media weight		16~43lb (60 to 163g/$_{m^2}$)	16~43lb (60 to 163g/$_{m^2}$)
Sensing		Paper detection sensor	Paper detection sensor
Standard Cassette Tray - Semi cassette type			
Capacity		150 sheets @ 75g/$_{m^2}$	150 sheets @ 75g/$_{m^2}$
Media sizes		76 x 127 mm (3" x 5") ~ 216 x 356 mm (8.5" x 14")	76 x 127 mm (3" x 5") ~ 216 x 356 mm (8.5" x 14")
Media types		Envelopes, Labels, Card stock, Transparency(mono only) Papers (Pre-printed, recycled)	Envelopes, Labels, Card stock, Transparency(mono only) Papers (Pre-printed, recycled)
Media weight		16~43lb (60 to 163g/$_{m^2}$)	16~43lb (60 to 163g/$_{m^2}$)
Size sensor		N/A	N/A
User Interface		No indicator, Cover	No indicator, Cover
Sensing		Paper detection sensor	Paper empty sensor
Optional Cassette Tray			
Capacity		250 sheets	250 sheets
Media sizes		A4,Letter,Legal, Folio, A5	A4,Letter,Legal, Folio, A5
Media types		Plain Paper	Plain Paper
Media weight		16~24lb (60 to 90g/$_{m^2}$, ,)	16~24lb (60 to 90g/$_{m^2}$, ,)
Size sensor		N/A	N/A
User Interface		No Indicator	No Indicator
Sensing		Paper empty sensor	Paper empty sensor
Output Stacking			
Capacity	FaceUp	N/A	N/A
	FaceDown	100sheets @ 75g/$_{m^2}$	100 sheets @ 75g/$_{m^2}$
Output Full sensing		Yes	Yes

CLX-3160 Series	CLX-3160N Spec.	CLX-3160FN Spec.
Duplex		
Supporting	Manual	Manual
Throughput	N/A	N/A
Media sizes	N/A	N/A
Media types	N/A	N/A
Media weight	N/A	N/A
ADF		
Paper Weight	12.5~28lb (Non Coating)	12.5~28lb (Non Coating)
Capacity	50 sheets (20lb, 75 g/㎡)	50 sheets (20lb, 75 g/㎡)
Document Size	Width: 142 ~ 216mm (5.6" ~ 8.5") Length : 148 ~ 356mm (5.8" ~ 14.0")	Width: 142 ~ 216mm (5.6" ~ 8.5") Length : 148 ~ 356mm (5.8" ~ 14.0")
Dimension	460(W)x 3430(D) x 95(H) mm	460(W)x 343(D) x 95(H) mm
Weight	5.6kg (,)	5.6kg (,)

2.1.2.7 Consumables

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
CRU			
No. of CRUs		6 (C/M/Y/K toner, Imaging Unit, Waste toner box) K toner: CLX-K3160A C toner: CLX-C3160A M toner : CLX-M3160A Y toner: CLX-Y3160A Imaging unit: CLP-R300A (CLP-300 Series) Waste toner box: CLP-W300A (CLP-300 Series) CMY Rainbow kit: CLX-P3160A	6 (C/M/Y/K toner, Imaging Unit, Waste toner box) K toner: CLX-K3160A C toner: CLX-C3160A M toner : CLX-M3160A Y toner: CLX-Y3160A Imaging unit: CLP-R300A (CLP-300 Series) Waste toner box: CLP-W300A (CLP-300 Series) CMY Rainbow kit: CLX-P3160A
Toner	Black	2,000 A4/Letter pages, at ISO-19752 Std. Coverage, Semi glossy	2,000 A4/Letter pages, at ISO-19752 Std. Coverage, Semi glossy
	Color	1,000 A4/Letter pages, at ISO-19752 Std. Coverage, Semi glossy	1,000 A4/Letter pages, at ISO-19752 Std. Coverage, Semi glossy
	Key	Unique, Electronic key(CRUM)	Unique, Electronic key(CRUM)
	Life detect	Toner Level Sensor Remain % method 90% : warning 100% : empty 120% : hardstop	Toner Level Sensor Remain % method 90% : warning 100% : empty 120% : hardstop
	Replace method	CMY key 3 step for install/replacing	CMY key 3 step for install/replacing
Imaging Kit (OPC+Deve)	Yield	Approx. 20K black pages (or 12.5K color pages)	Approx. 20K black pages (or 12.5K color pages)
	Key	Unique, Electronic key(CRUM)	Unique, Electronic key(CRUM)
	Sensor	None, that would be traced via software	None, that would be traced via software
	Replace method	6 steps for install/replacing	6 steps for install/replacing
Waste Toner Bottle	Yield	1,250 sheets (Full Color Std. Image) or 5,000 images	1,250 sheets (Full Color Std. Image) or 5,000 images
	Key	N/A	N/A
FRU			
No. of FRUs		4 (ITB, Fuser, T2 roller, Pick-up roller)	4 (ITB, Fuser, T2 roller, Pick-up roller)
ITB	Yield	Approx. 60K black pages (or 15K color pages)	Approx. 60K black pages (or 15K color pages)
	Key	None	None
	Sensor	None	None
Fuser	Yield	100,000 sheets B&W or 50,000 sheets Color	100,000 sheets B&W or 50,000 sheets Color
	Key	None	None
T2 Roller	Yield	100,000 sheets, Replacable	100,000 sheets, Replacable
	Key	None	None
Pick-up Roller	Yield	50,000 sheets, Replacable	50,000 sheets, Replacable
	Key	None	None
ADF Lubber PAD		100K	100K
ADF Pickup Roller		100K	100K

2.1.2.8 Reliability & Service

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Printing Volume(AMPV)		360 page / B&W, 240 page / Color	360 page / B&W, 240 page / Color
Max Monthly Duty		24,200 images	24,200 images
MPBF		40,000 pages (color 29,091 Mono 10,909 Total 40,000 image)	40,000 pages (color 29,091 Mono 10,909 Total 40,000 image)
MTTR		< 30 min.	< 30 min.
SET Life Cycle		200,000 image or 5 years	200,000 image or 5 years
Real-time Clock		None	None
System-record		Total image count Total page count (color/mono) Imaging unit life Fuser lifeTransfer roller life Transfer unit life Toner image count (CMYK) Tray roller life Cartridge Coverage Machine Installed date	Total image count Total page count (color/mono) Imaging unit life Fuser lifeTransfer roller life Transfer unit life Toner image count (CMYK) Tray roller life Cartridge Coverage Machine Installed date
Test Print		Configuration Sheet Network Configuration Sheet	Configuration Sheet Network Configuration Sheet
RDC	Comm. Mode	N/A	N/A
	Operation	N/A	N/A
Temperature	Operating	10 ~ 32.5 (59 ~ 90.5F)	10 ~ 32.5 (59 ~ 90.5F)
	Storage (Packed)	-20 ~ 40 (-4 ~ 104F)	-20 ~ 40 (-4 ~ 104F)
Humidity	Operating	30 ~ 80% RH	30 ~ 80% RH
	Storage (Packed)	30 ~ 85% RH	30 ~ 85% RH

2.1.2.9 Environment

CLX-3160 Series		CLX-3160N Spec.	CLX-3160FN Spec.
Acoustic Noise Level(Sound Power/Pressure)	Printing	Less than 49.0 dBA (B/W printing)	Less than 49.0 dBA (B/W printing)
	Copying	Less than 52.0 dBA	Less than 52.0 dBA
	Standby	Less than 35 dBA	Less than 35 dBA
	Sleep	Background noise level	Background noise level
Input Voltages		110-127 VAC, 50/60Hz	110-127 VAC, 50/60Hz
		220-240 VAC, 50/60Hz	220-240 VAC, 50/60Hz
		Power Switch	Power Switch
Power Consumption	Ready	Less than 160w	Less than 160w
	AVG.	Less than 350W *Curremcy : 5A(110V) / 3A(220V)	Less than 350W *Curremcy : 5A(110V) / 3A(220V)
	Max/Peak	700W/1KW	700W/1KW
	Sleep/Power Off	Less than 30W	Less than 30W
Certification	Telecommunication	N/A	N/A
	Environmental	Energy star, TCO99 or TCO03/Swan/ Blue Angel, PTS (BAM)	Energy star, TCO99 or TCO03/Swan/ Blue Angel, PTS (BAM)
	Safety	Europe : TUV(GS), SEMKO(IEC950/ EN60950), CB	Europe : TUV(GS), SEMKO(IEC950/ EN60950), CB
	EMC/EMI	FCC Class B	FCC Class B
		CE class B	CE class B
Emission	Ozone	0	0
	Dust	0	0
	Styrene	0	0
	VOC	0	0
Dimension (W x D x H)	Set(mm)	460(W)x429(D)x486(H)	460(W)x429(D)x486(H)
	Set Packing	610(W)x570(D)x638(H)	610(W)x570(D)x638(H)
Weight	Set (with consumables)	19.5 Kg	19.5 Kg
	Set Packing	26.0 Kg	26.0 Kg
	Consumable	- Imaging Unit : 3.2 Kg - Toner Cartridge(C/M/Y each) : 0.102 Kg - Toner Cartridge(Black) : 0.176 Kg	- Imaging Unit : 3.2 Kg - Toner Cartridge(C/M/Y each) : 0.102 Kg - Toner Cartridge(Black) : 0.176 Kg
	Consumable Packing	- Imaging Unit : 4.0 Kg - Toner Cartridge(C/M/Y each) : 0.110 Kg - Toner Cartridge(Black) : 0.180 Kg	- Imaging Unit : 4.0 Kg - Toner Cartridge(C/M/Y each) : 0.110 Kg - Toner Cartridge(Black) : 0.180 Kg

2.1.2.10 Packing & Accessory

CLX-3160 Series	CLX-3160N Spec.	CLX-3160FN Spec.
In-Box	Set C/M/Y/K to be installed Power cord USB cable (China, Korea, India, Russia) Set-up CD (Driver, manual), Application N/W CD (SyncThru, manual) Quick installation Guide sheet Warranty book	Set C/M/Y/K to be installed Power cord USB cable (China, Korea, India, Russia) Set-up CD (Driver, manual), Application N/W CD (SyncThru, manual) Quick installation Guide sheet Warranty book

2.1.2.11 Options

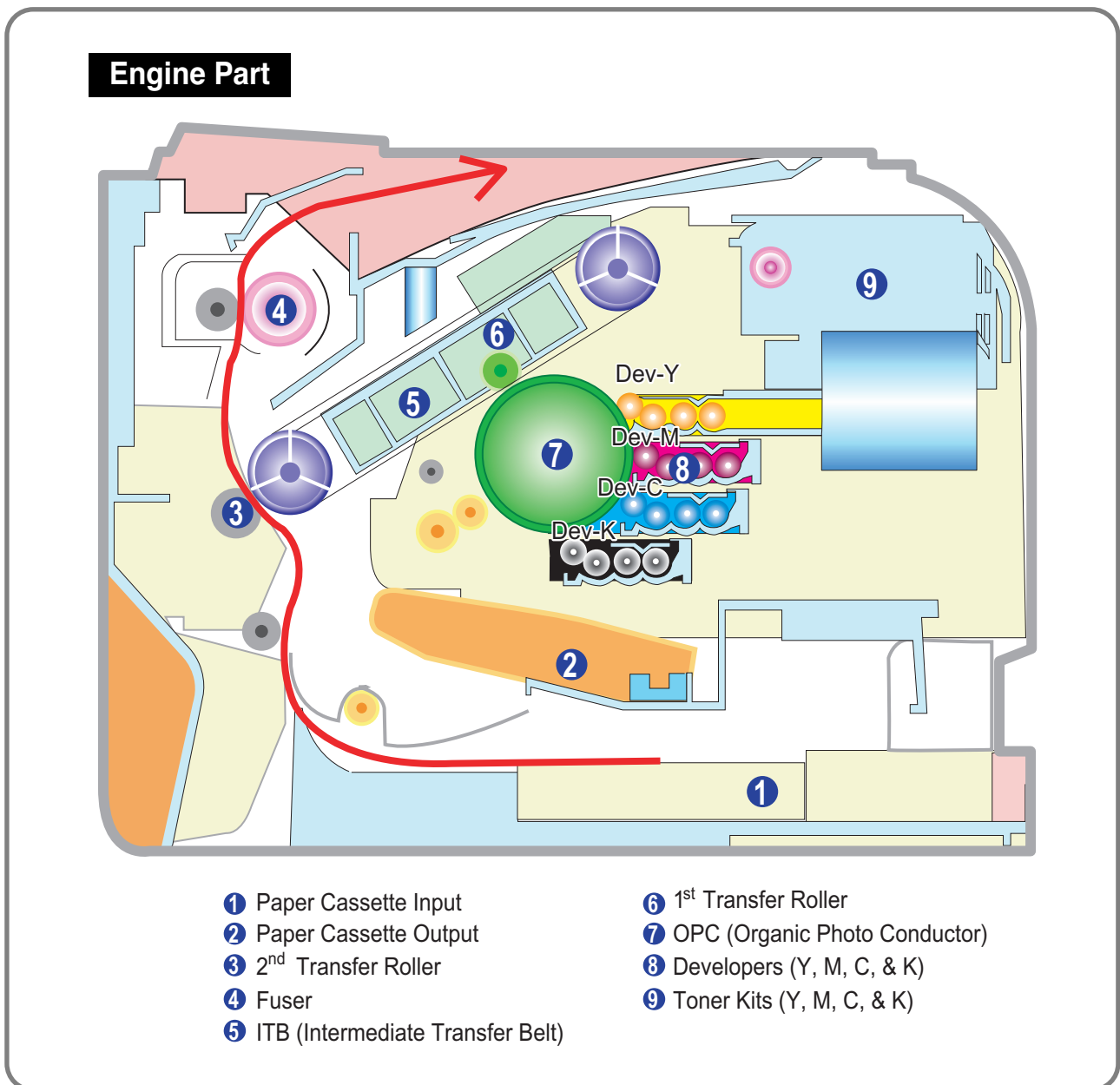| CLX-3160 Series	CLX-3160N Spec.	CLX-3160FN Spec.
Second Cassette	250-sheet SCF	250-sheet SCF
Memory	N/A	N/A
PostScript	N/A	N/A
Network	Default	Default
Wireless Network	N/A	N/A
Hard Disk	N/A	N/A
Duplex Unit	N/A	N/A

2.1.3 Model Comparison Table

	Canon MF8170C	Ricoh	Samsung CLX-3160FN
Image			
Function	Print/Copy/Scan/NW/Fax	Print/Copy/Scan/NW	Print/Copy/Scan/NW
Engine Speed	16/4 ppm	31/8 ppm	B/W 16ppm, Color 4ppm
Size (WxDxH)	510 x 513 x 587 mm	460 x 420 x 515 mm	460 x 432 x 484 mm
Consumable	5K K toner 4K CMY toner 20K Drum	9.8K K toner 6.5K CMY toner 60K 11K Waste box	2K K toner 1K CMY toner 60K 1.25K sheet Waste box

2.2 System Overview

This chapter describes the functions and operating principles of the main components.

2.2.1 System Structure

2.2.1.1 Main Parts of System

Engine Part

Dev-Y

Dev-M

Dev-C

Dev-K

❶ Paper Cassette Input
❷ Paper Cassette Output
❸ 2nd Transfer Roller
❹ Fuser
❺ ITB (Intermediate Transfer Belt)

❻ 1st Transfer Roller
❼ OPC (Organic Photo Conductor)
❽ Developers (Y, M, C, & K)
❾ Toner Kits (Y, M, C, & K)

❶ Cassette
· Feeding Method : Cassette Type
· Feeding Standard : Center Loading
· Feeding Capacity : Cassette 150 Sheets(75g/ ㎡, 20lb Paper Standard)
 No Manual Feeder
· Paper Detecting Sensor : Photo Sensor (Empty, Registration, Exit)
· Paper Size Sensor : None

❷ LSU(Laser Scan Unit)
· Consisted of LD(Laser Diode) and Polygon Motor Control.

Error	Phenomenon
Polygon Motor Error	The Rotation of Polygon Motor can not reach stable
Hsync Error	Though the rotation of Polygon Motor reach stable, the signal of Hsync is not occurred

❸ 2ⁿᵈ Transfer Ass′y
· The life span: Print over 100,000 sheets (in 15~30 ℃)
· Specification: Similar to CLP-300 Series

❹ Fuser Ass′y

· Heat Lamp : New Part - Knuckle Type
· Heat Roller : Similar to CLP-300 Series
· 2 Pressure Roller : One is similar to HummingBird, the Other is a new added part comparing with
                           other Fuser
· Thermistor - Temperature-Measuring Device
· Thermostat - Critical Temperature-Detecting Device
· Fusing Temp. (180℃)
· H/W Protection Temp. (185℃)

❺&❻ ITB(Intermediate Transfer Belt) & 1st Transfer Roller
· The life span: Print over 100,000 Images
· The ITB unit includes 1st Transfer Roller

❼&❽ OPC(Organic Photo-Conductor) & Developer
· The life span: Print over 44,000 Images (Both)
· Imagine Unit consists of 4 kinds of Developer , OPC, and Deve. Main Frame

❾ Toner Kits
· The life span: Color -> 1000 images (Std. Coverage Print-Out)
               Black -> 2000 images (Std. Coverage Print-Out)

Driver Ass′y
· It is a power delivery unit by gearing
· By driving the motor, it supplies the power to the feeding unit, the fusing unit, and the distributing unit.
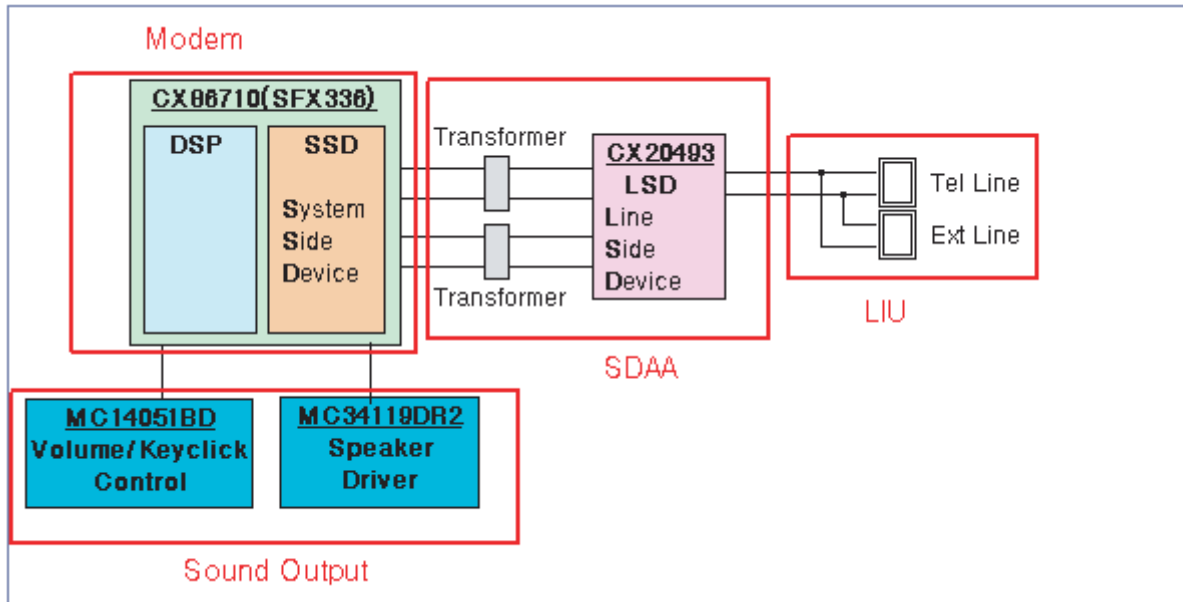· The Main Motor is similar to CLP-300 Series Main Motor.

2.2.1.2 Scanner(ADF)

· 3 in 1 : CLX-3160N

· 4 in 1 : CLX-3160FN

· Scanning Method: Color CCD(600 x 1200 dpi)

· Scan speed : SDMP 28cpm/MDSP 20cpm
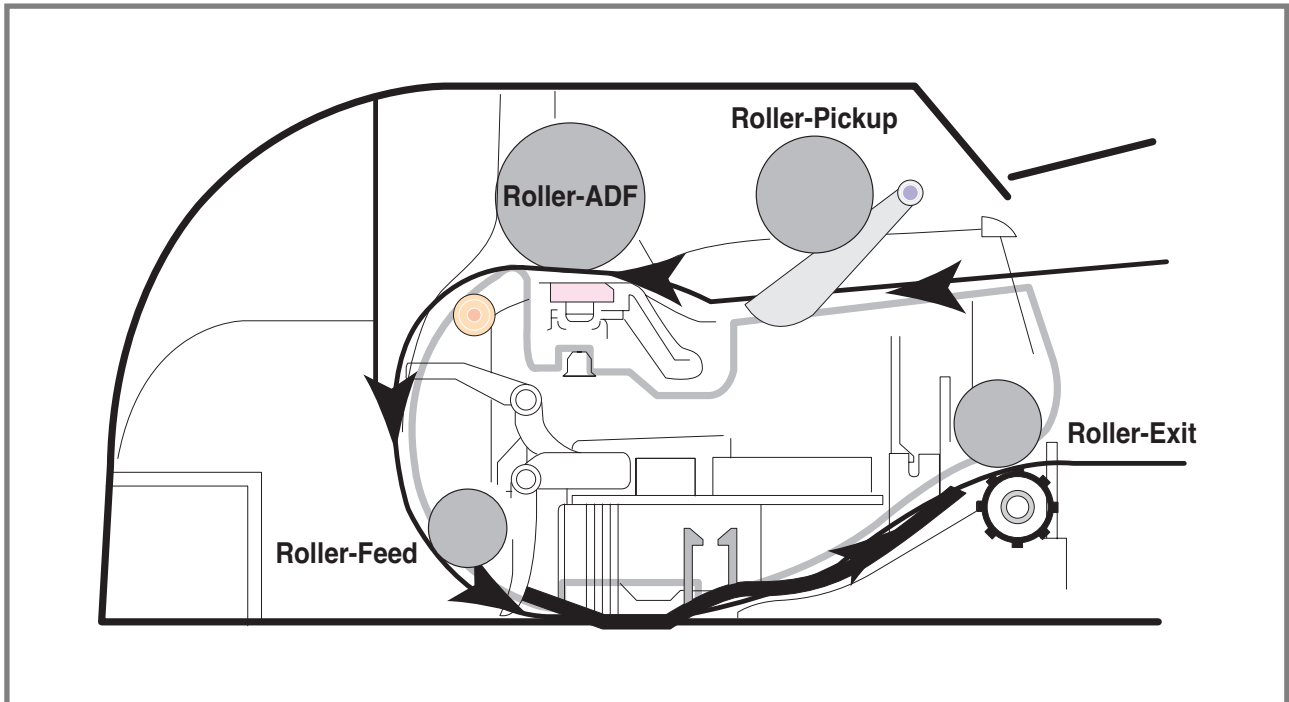
2.2.1.3 FAX Section

Modem Part

BLOCK DIAGRAM

Implemented by based on Conexant DAA (Data Access Arrangement) Solution, and is roughly composed of two kinds Chip Solution

- CX86710 (SFX336): Existing Modem Chip which adds SSD (System Side Device) for interfacing between LSD and DIB of FM336Plus Core

- CX20493 (LSD) : LIU (Line Interface Unit) Chip which is controlled by SSD and satisfies each PSTN Requirements by modulating internal Configuration with connecting Tel Line.

Modem (SFX336) specification.

· 2-wire half-duplex fax modem modes with send and receive data rates up to 33,600 bps
· V.17, V.34, V.29, V.27 ter, and V.21 Channel 2
· Short train option in V.17 and V.27 ter
· PSTN session starting
· V.8 and V.8bis signaling
· HDLC support at all speeds
· Flag generation, 0-bit stuffing, ITU CRC-16 or CRC-32 calculation and generation
· Flag detection, 0-bit deletion, ITU CRC-16 or CRC-32 check sum error detection
· FSK flag pattern detection during high-speed receiving
· Tone modes and features
· Programmable single or dual tone generation
· DTMF receiver
· Tone detection with three programmable tone detectors
· Receive dynamic range:
· 0 dBm to -43 dBm for V.17, V.29, V.27 ter and V.21 Channel 2
· 9dBm to -43 dBm for V.34 half-duplex
· Digital speaker output to monitor received signal
· Two16-byte FIFO data buffers for burst data transfer with extension up to 255 bytes
· V.21 Channel 1Flag detect
· V.21 Channel 1Flag detect
· +3.3V only operation
· Typical power consumption
· Normal mode: 264 mW

Signal Transition of DAA Solution

Line Interface Signal of Tel Line and LSD is Analog Signal.

2) there is A/D, D/A Converter in LSD, so Analog Signal from Tel Line is converted in Digital through A/D Converter in DAA and transfer to SSD by DIB Capacitor
   Digital Signal from SSD is converted to Analog by D/A Converter in DAA and transfer to Tel Line
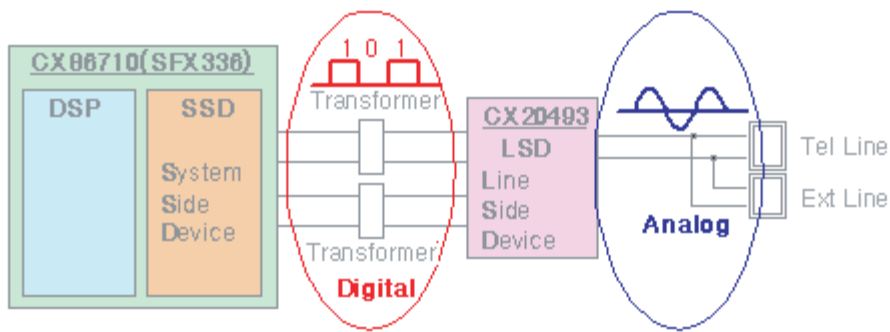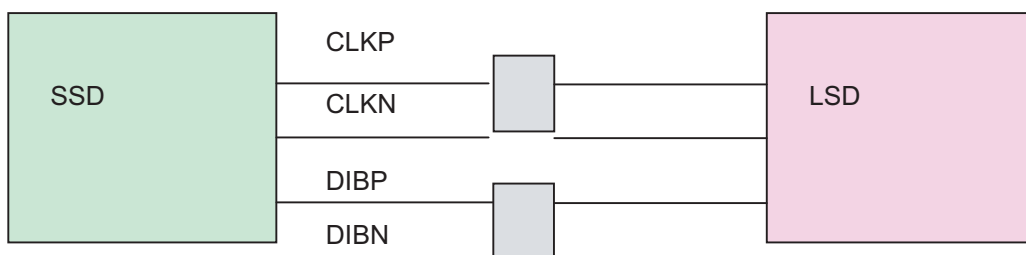

Transformer transfer Clock from SSD to LSD and Clock Frequency is 4.032MHz.

LSD full wave rectifies Clock to use as inner Power supply and also use as Main Clock for DIB Protocol Sync between LSD and SSD. Transformer transfer Clock by separating Primary and Secondary, and
amplifies Clock Level to LSD by Coil Turns Ratio 1:1.16.

■ Clock

- Clock is supplied by transformer from SSD to LSD, and there is PWROUT to adjust output impedance of Clock

Out Driver is inside SSD and CLKSHIGH Resistor to adjust duty of HLPWR Resistor and Clock.

Clock from SSD to LSD has Differential structure of 180 phase difference for Noise Robustness

DIB Data transfer Data from SSD to LSD by Transformer, and also transfer specific data from LSD to SSD.

After transferring data from SSD, RSP is transferred and LSD recognizes RSP and change LSD to output Driver transfer Data to SSD.

DIB Data form SSD to LSD by Transformer has Differential structure of 180 phase difference between DIBP and DIBN for Noise Robustness

2.2.1.4 Line Interface Part

This is Connection Part between system and PSTN(Public Switched Telephone Network), and primary circuit is usually located. Main functions are Line Interface, Telephone Connection and Line Condition Monitoring.

1 Telephone Line Connection

① Modular Plug : RJ-11C

② LIU PBA Modular Type : 623 PCB4-4

③ Line Code Length : 2500 $\pm$ 50mm

④ Line Code Color : Black

ON HOOK state Characteristic

1) DC Resistance

① DP Dial Mode (Direct Current 30mA) : 50 ~ 300ohm

② DTMF Dial Mode (Direct Current 20mA) : 50 ~ 540ohm

2) Ring Sensitivity

① Ring detection Voltage : 40Vrms ~150Vrms (condition : Current = 25mA, Frequency = 15Hz)

    product Margin : 30Vrms ~150Vrms

② Ring detection Frequency : 15.3Hz ~68Hz (condition : Voltage = 45Vrms, Current = 25mA)

    product Margin : 15Hz ~70Hz

③ Ring detection Current : 20mA ~ 100mA (condition : Voltage = 40Vrms, Frequency = 20Hz)

    product Margin : over 15mA

3) False Ring Sound

① Ring Frequency : 750 Hz + 1020 Hz

② Ring interrupt Cycle : On/Off depending on input Ring Signal Cycle.

2.2.1.5 Scan Part

Pictorial signal input part: output signal of CCD passes through Bypass Cap change to ADC at HT82V26, and defined signal between HT82V26 and CHORUSm processes the Image signal. When AFE accept each pixel, CDS(Correlated Double Sampling) technique which samples arm-level twice is used on each pixel by using CIP4e signal.

2) Pictorial image processing part: read CCD Pixel data in terms of 600dpi Line and process Error Diffusion Algorithm on Text mode and Photo mode, and then store Data at Scan Buffer on PC Scan mode without algorithm.

On every mode Shading Correction and Gamma Correction are executed ahead, then processing is executed later.

 * Scan Image Control Specification

① Minimum Scan Line Time : 0.7062ms

② Scan Resolution : Max. 600DPI

③ Scan Width : 216mm

④ main function

   - Internal 12bit ADC

   - White Shading Correction

   - Gamma Correction

   - CCD Interface

   - 256 Gray Scale

3) CCD Operating Part : CCD Image sensor use +5V and Inverter uses +24V

   - CCD Maximum Operating Frequency : 10MHz

   - CCD Line time : 0.7062ms

   - White Data output Voltage : 0.7V ±0.5V (Mono Copy, 0.75ms/line)

   - Maximum Inverter Current : 600 mA Max.(+24V)

## 2.2.1.6 OPE Pannel Section

(1) Configuration

Operations Panel uses Main Control and separated OPE Chip Micom and work as inner program,
systemic operation is serial system which exchange Date with SIO Port of Main Control. OPE Panel is approximately composed of Micom part, Matrix part and LCD.
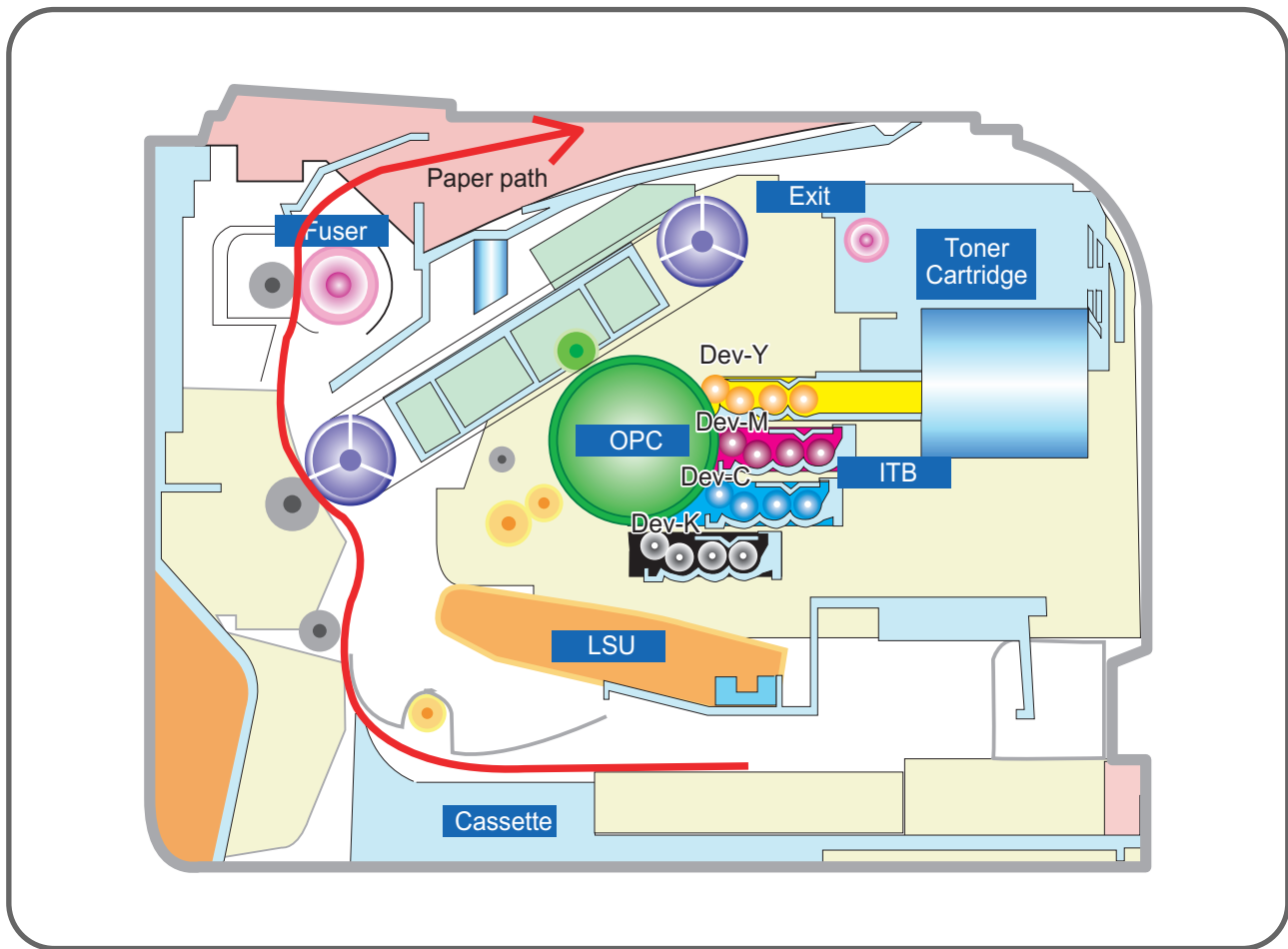
(2) Micom controller

Micom has ROM, RAM, I/O Port built-in and displays and lights LCD by CPU command of Main Control Part and report Key recognition Data to Main Control Board.

2.2.1.7 EP Process

- Structure of EP Process
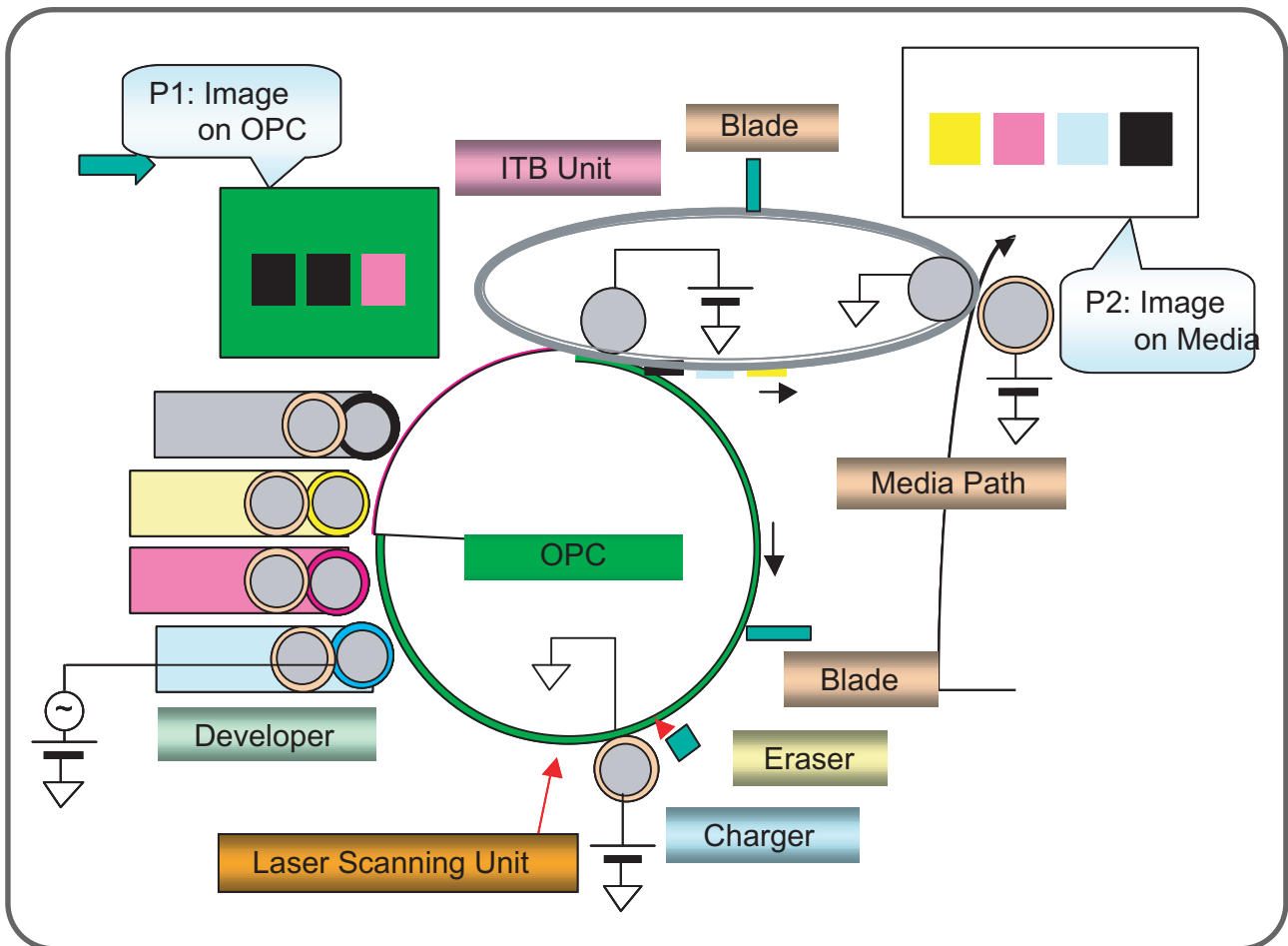
- System Outline

❶ **Charging**

  · Conductive Roller charging
  · Roller resistivity : ~ 10^5 ohm-cm
  · Applied voltage : -1.1kV
  · Charge acceptance : -520V
  · OPC coating thickness : 21um
  · OPC diameter : ϕ60mm
  · Non eraser system

1. Organic Photoconductor is charged to uniform voltage by conductive roll charging method
2. No ozone is produced because corona is not used
3. Charger roll is cleaned with cleaning roll
4. Toner remained on OPC after T1 process is cleaned by cleaning blade and retrieved into waste toner box by auger and belt driving mechanism

❷ **Exposing**

· One polygon motor (6 facet)
· Single beam LD (1ea)
· LD wavelength : 785nm
· Polygon motor rpm : 23747.5
· LSU energy : 0.25uJ/cm^2
· OPC exposed potential : -50V

1. Exposing is implemented by laser striking on to OPC with uniform potential
2. Laser beam is modulated according to image to be printed that is from PC
3. Latent Image is formed on OPC, which is developed with toner

❸ **Developing**

· Non-magnetic, mono component
· Non-contact development
· Developing bias : DC + AC
· AC peak to peak : 1.5 ~ 2.0kV
· Mass on developing roller : 550 ~ 600ug/cm^2
· Toner coulomb : 15 ~ 20uC/g
· Roller diameter : ⌀10mm
· Roller resistivity : 10^5 ~ 10^6 ohm-cm
· Process speed ratio : 1.2 (OPC=1.0)
· Color order : Y -> M -> C -> K

1. Only latent image formed by exposing process is developed with toner
2. AC + DC Voltage is being used to develop toner into latent image on OPC because non-contact developing method is adopted
3. Y, M, C, and K Images are sequentially developed onto OPC and transferred onto Intermediate Transfer Belt (hereafter ITB) to form a color image on ITB
4. Toner Bottles are used to supply toner into developer compartment
5. Toner level is being sensed to control toner supply from toner bottle to developer

❹ **Transfer 1**

· Multi-pass transfer
· Indirect transfer
· Transfer voltage : 0.5 ~ 2.0kV (controllable)
· Roller diameter : ⌀14mm
· Roller resistivity : ~ 10^7 ohm-cm
· Belt resistivity : 10^9 ~ 10^11 ohm-cm
· Environment sensing by Y-transfer roller
· Transfer unit life : 50K images

1. Developed Image on OPC is transferred onto ITB by T1 Process
2. T1 Voltage is positive which attract toner to ITB
3. 4 times of T1 process is required to make a color image on ITB, which means multi-pass process
4. ITB has a hole as a fiducial mark for timing. Engine control for color image is synchronous with it, ITB Home Sensing Signal

❺ Transfer 2

· Indirect transfer
· Transfer voltage : 1 ~ 4.0kV (controllable)
· Roller diameter : ϕ18.6mm
· Roller resistivity : ~ 10^7 ohm-cm
· Belt resistivity : 10^9 ~ 10^11 ohm-cm
· Transfer unit life : 50 K images

1. Color image formed on ITB is transferred onto media by T2 process
2. T2 voltage is also positive to get color image moved onto media
3. Toner remained on ITB after T2 process is cleaning by ITB cleaning blade and collected and
4. Transported and retrieved into waste toner box by auger and belt driving system
5. T2 Roll is engaged when color image is being transferred onto media. Otherwise it is disengaged. Clutch is used for driving T2 Roll engagement and disengagement

❻ Fusing

· 3 Roll system
    -> short warm-up time (45sec)
· Post Pressure Roll

1. Color Image on media is melted down and fixed into media by fusing process

2.2.1.8 Copier Section

|	
Copy Mode:	Black and White
Scanner Type; Maximum Size of Original: (max. width = 218 mm, max length = 400 mm)	CCD with Flatbed/Platen and ADF -Platen: 216 x 297 mm -ADF: Legal (216 x 356 mm)
Optical Resolution:	600 x 600 dpi
Copy Quality - H x V: (User selectable via Content button)	-Text : 600 x 300 dpi (default) -Text/Photo : 600 x 300 dpi -Photo : 600 x 600 dpi

Supported Media Types:
 	
Copy Speed:
(SDMP = Single Document,
        Multiple Printout,
MDSP = Multiple Document,
        Single Printout)
	Plain, Label, Cardstock, Transparency
	
	-Platen, SDMP: 30cpm (Letter)
	-ADF, SDMP: 30cpm (Letter)
	-ADF, MDSP: 20cpm (A4, Text or Text/Photo)
	                10cpm (A4, Photo)

Reduce/Enlarge:	-Platen: 25% - 400% (1% increments) -ADF: 25% - 100% (1% increments)
Non-printable Area:	4 mm (Top, Bottom, and each Side)
Copy Count: (Page count displayed on LCD during copy operation)	1 to 199
Copy Modes:	Text, Text/Photo, Photo
Fixed R/E Setting:	100%, Auto-fit, 2(4)-Up
Darkness Control:	3 levels
First Copy Output Time (FCOT):	-Platen: 8.5 sec. (600 x 300 dpi) -ADF: 15 sec. (600 x 300 dpi)

2.2.1.9 Telephone Section

|	
Speed Dial:	400 Locations (46 digits maximum per location)
On-hook Dial (manual fax):	Yes
Last Number Redial:	Yes
Automatic Redial:	Yes
Pause:	Yes (using Redial key)
Ringer Volume:	Off, Low, Medium, High
Tone/Pulse:	Selectable (Tech Mode Only no Telecom certification for Pulse mode)

2.2.2 Main PBA Description

2.2.2.1 Print Board Assembled(PBA) Pictures

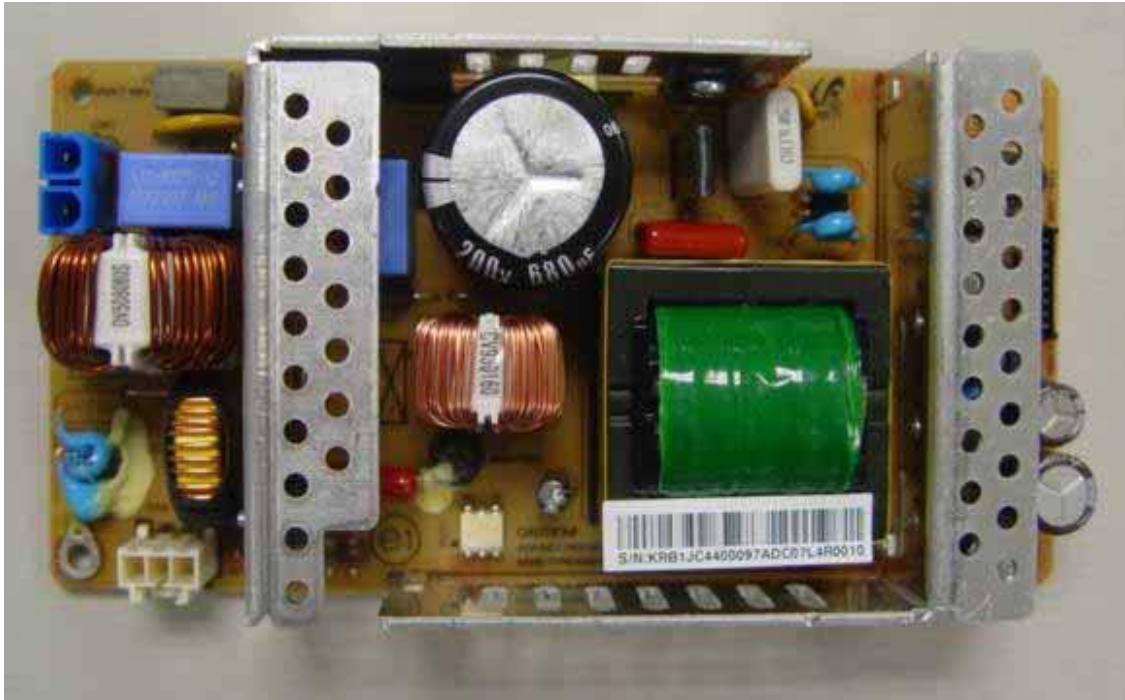**1) Top View of Main Controller**
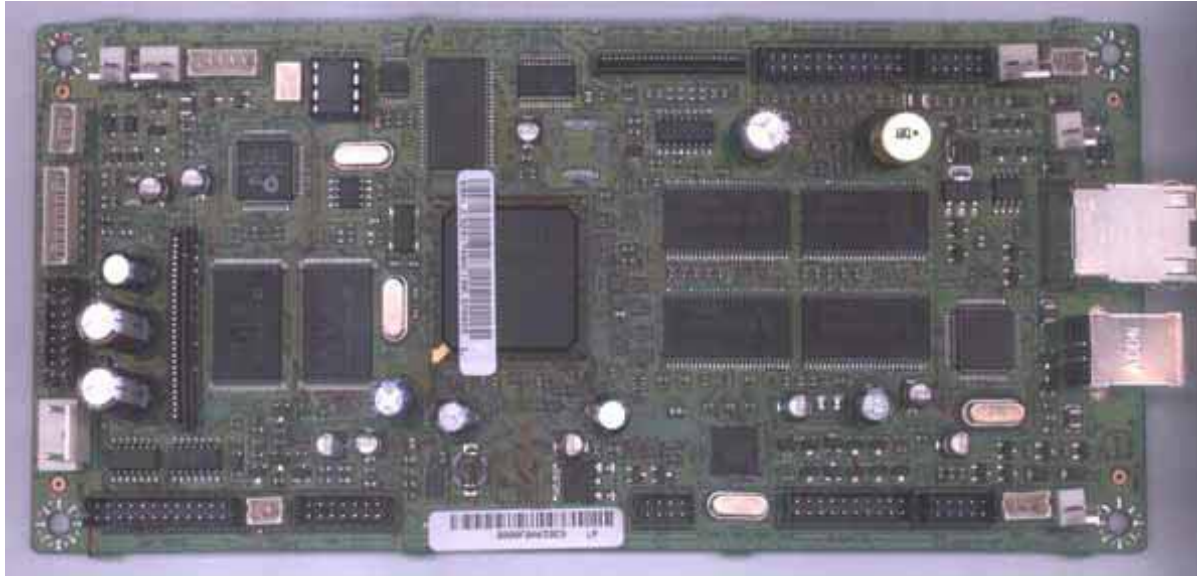
2) Bottom View of Main Controller
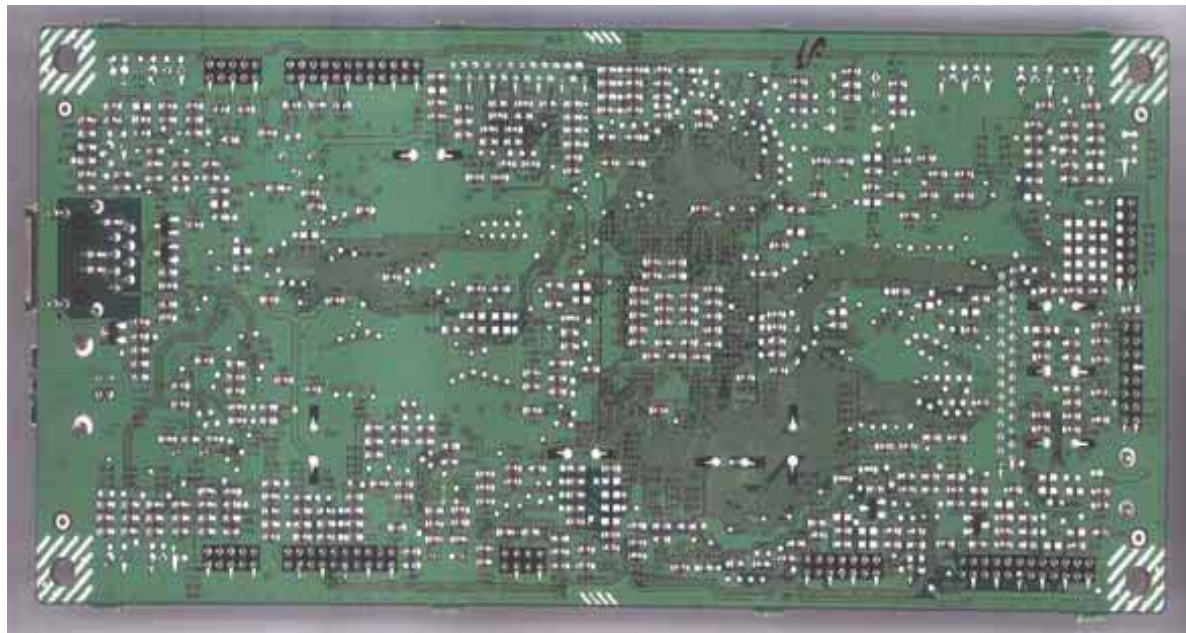
3) Top View of SMPS

4) Bottom View of SMPS
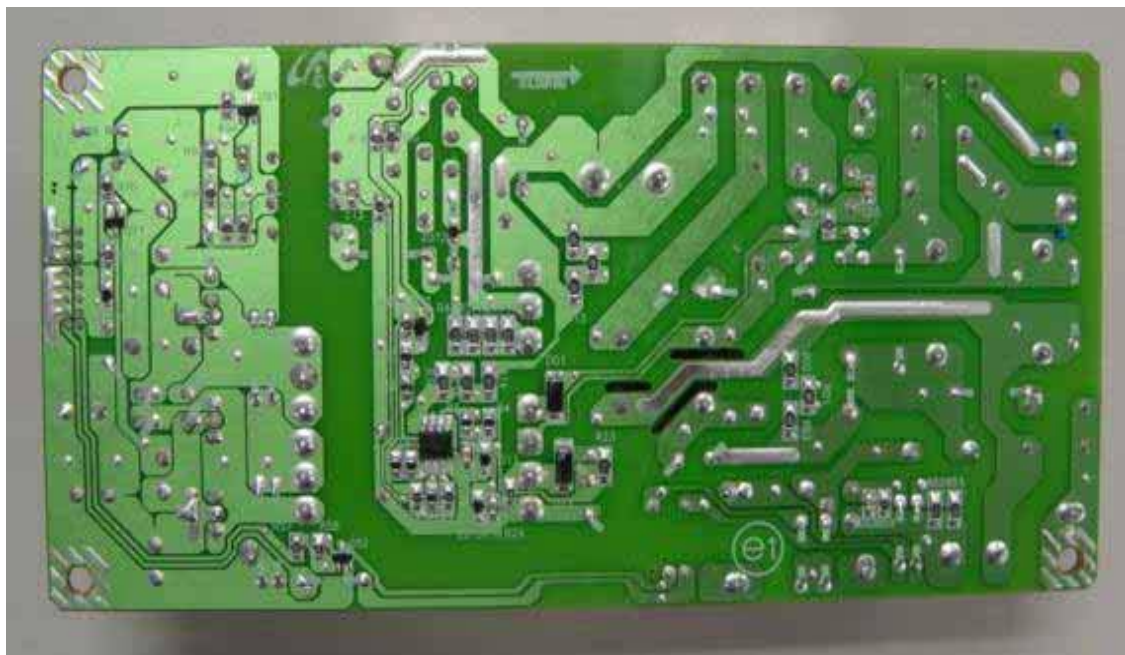
5) Top View of HVPS
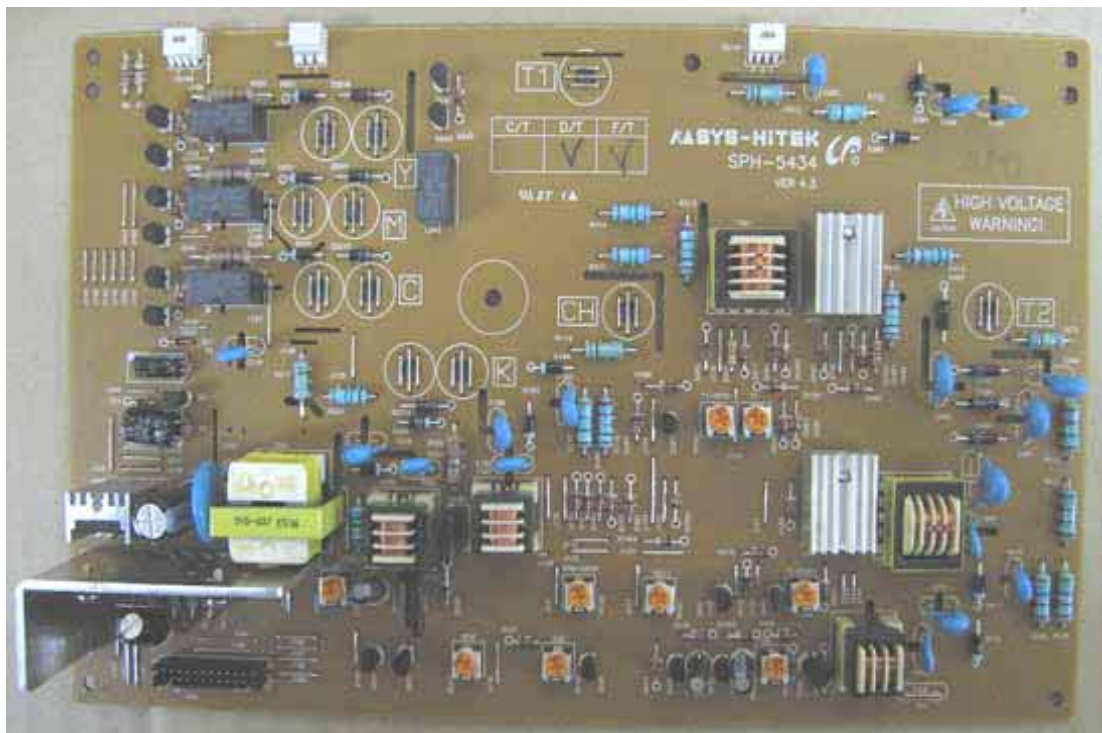
6) Bottom View of HVPS
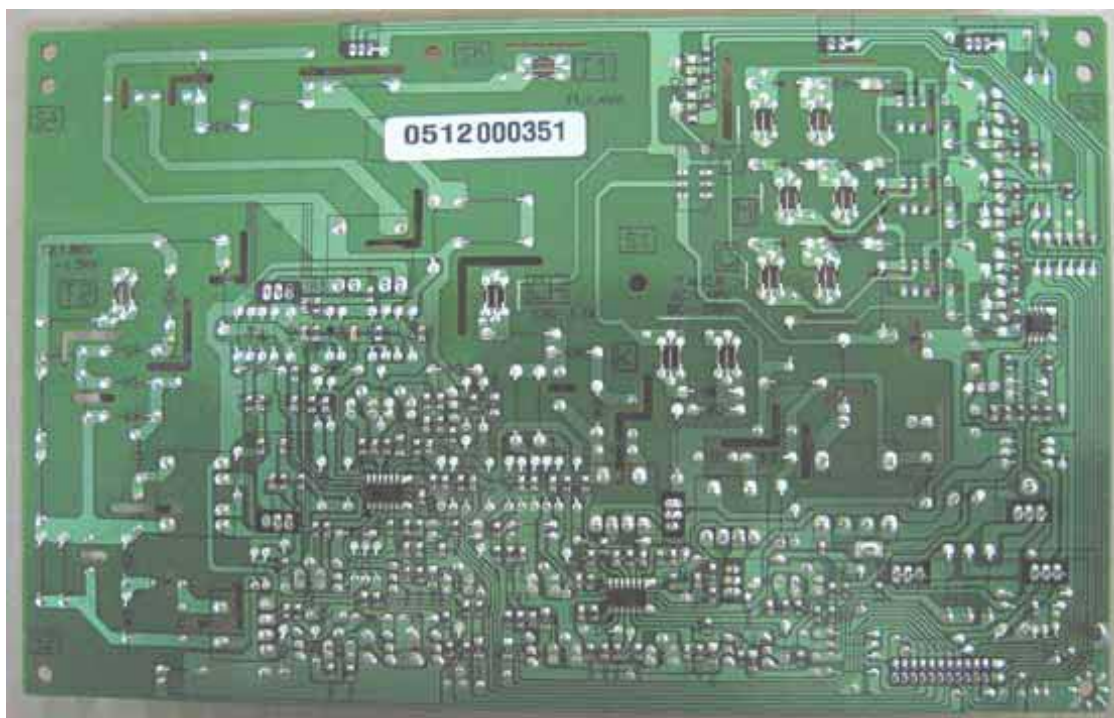
7) Top View of OPE

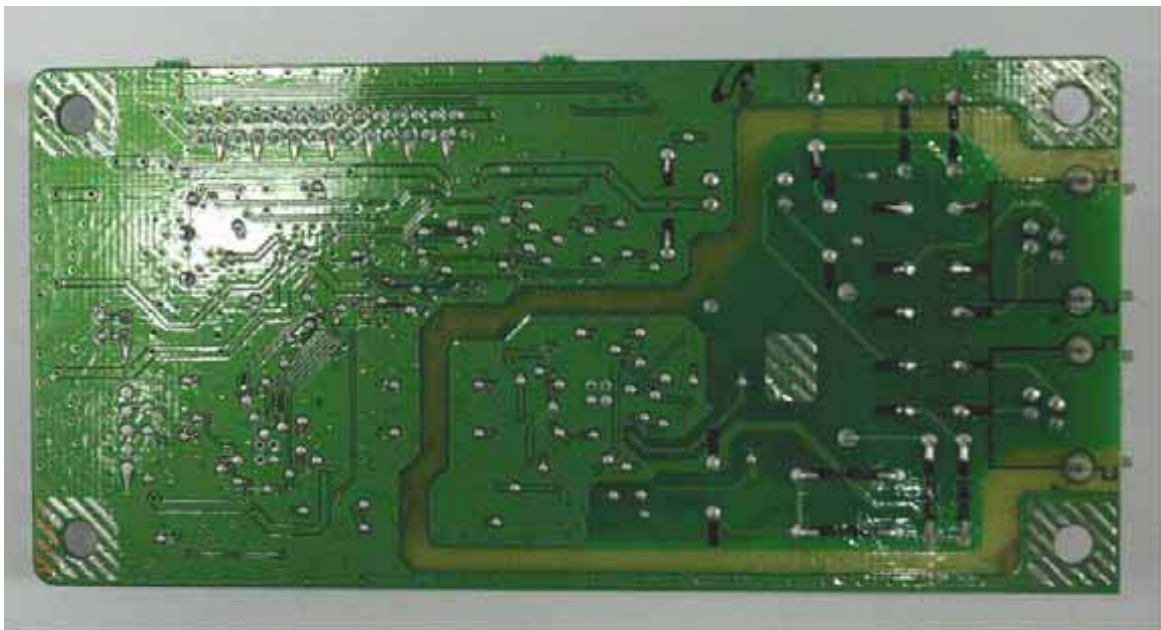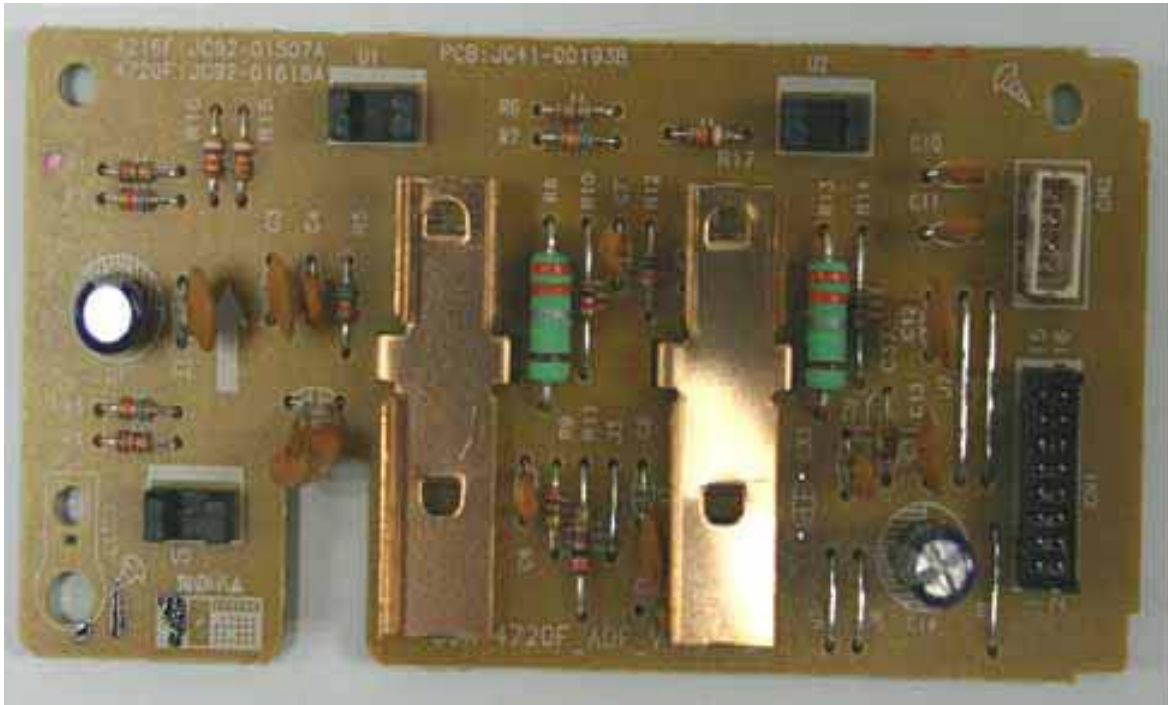## 8) Bottom View of OPE
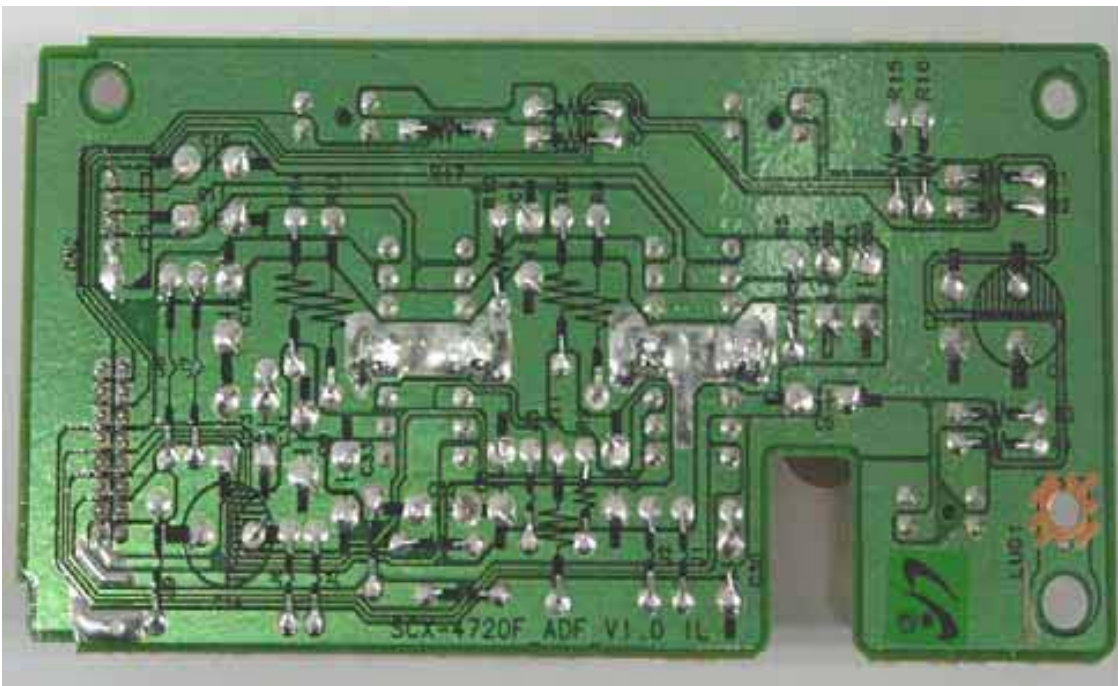
9) Top View of FAX

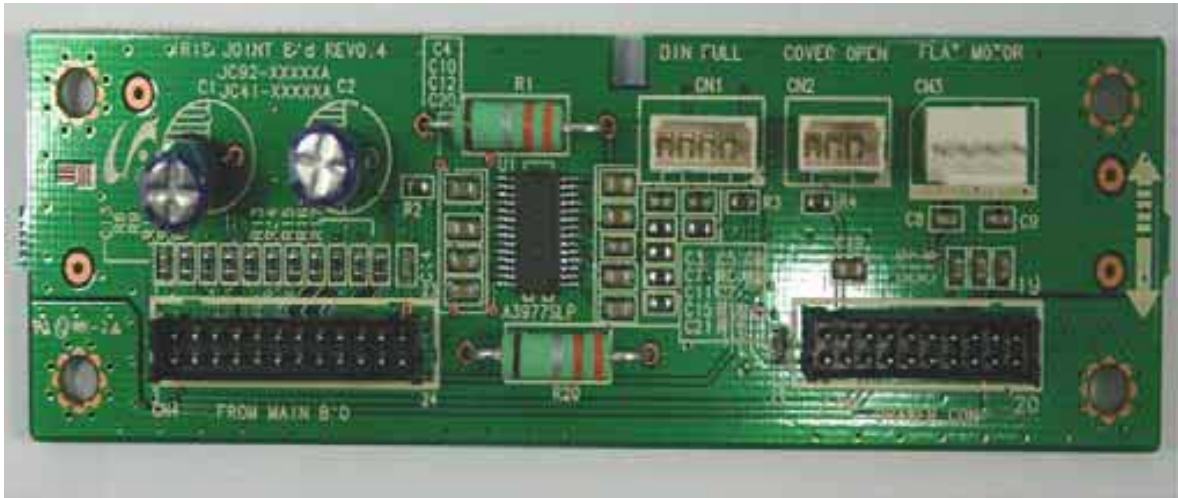## 10) Bottom View of FAX

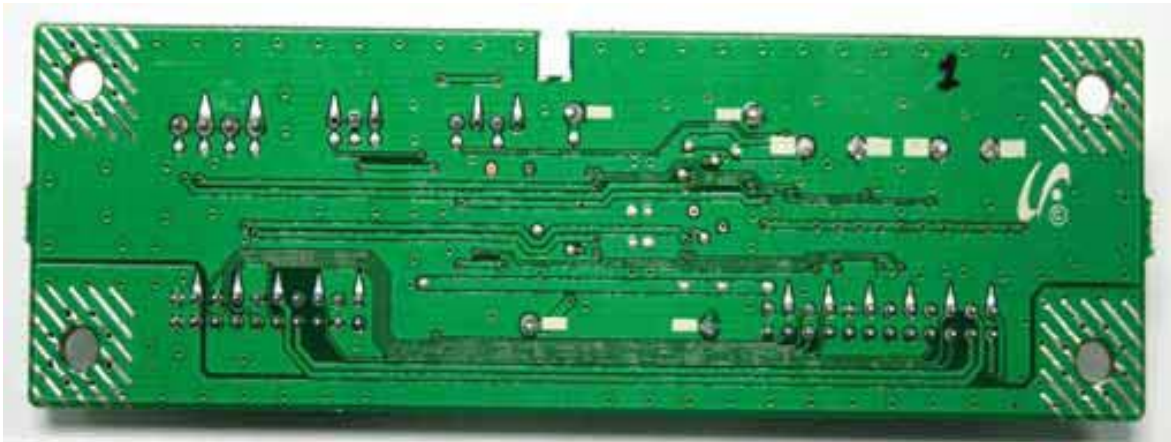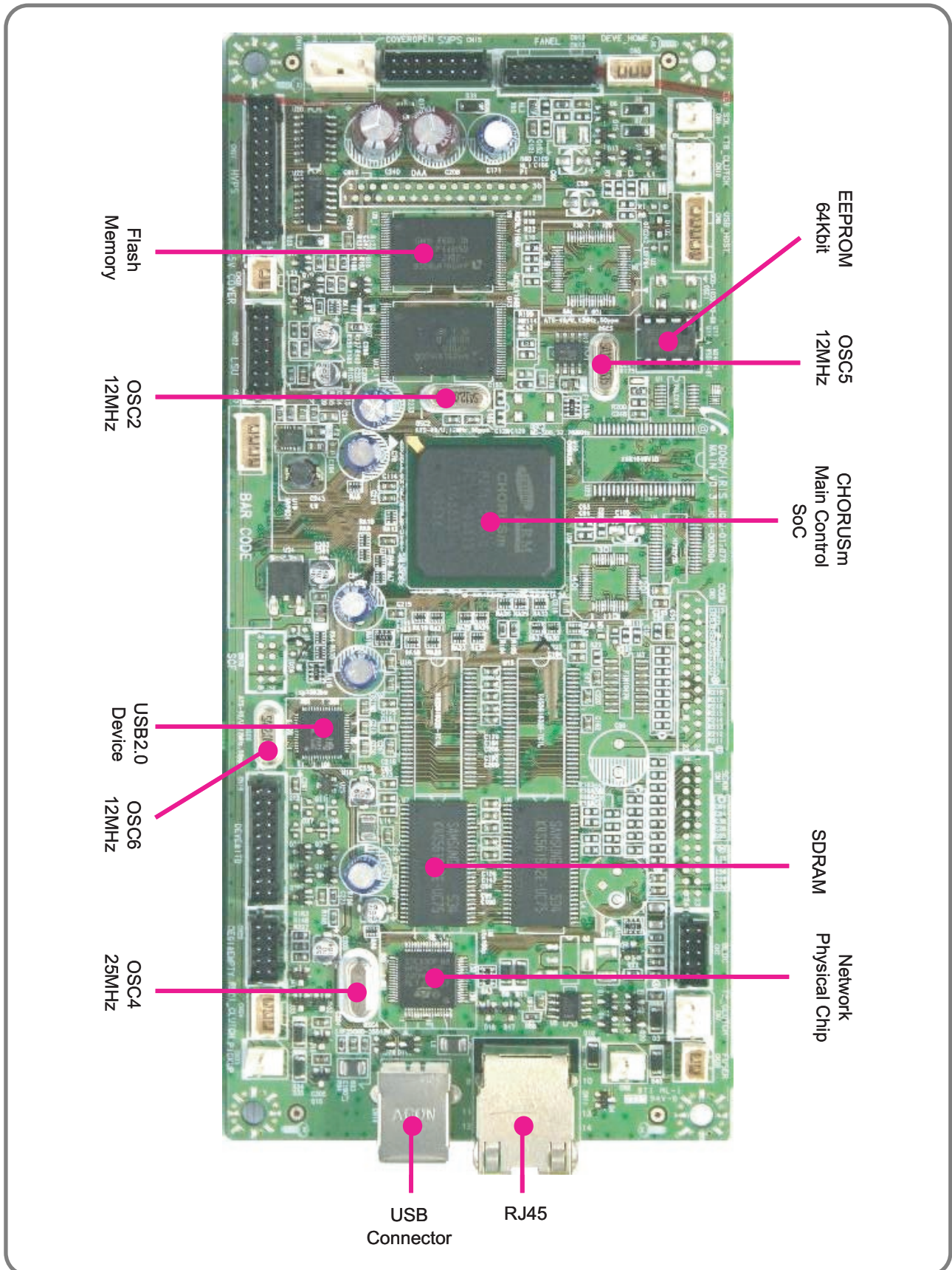## 11) Top View of ADF

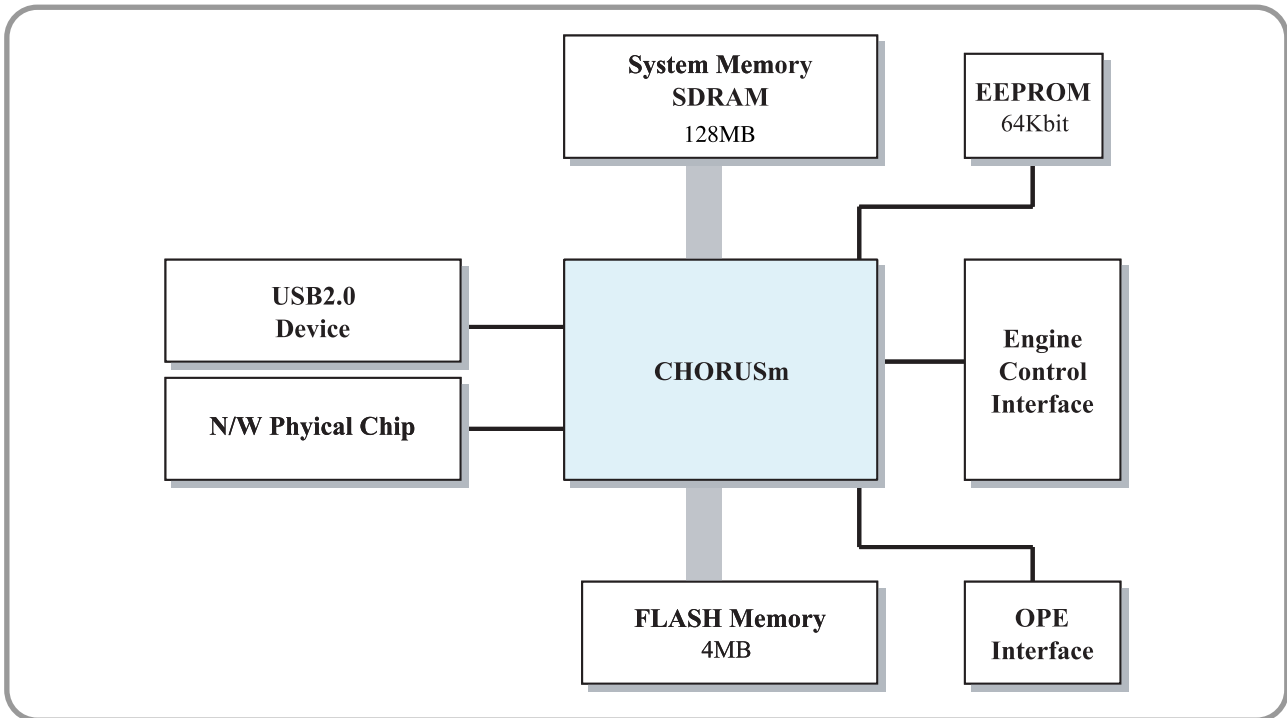## 12) Bottom View of ADF

13) Top View of Joint B'D

14) Bottom View of Joint B'D

2.2.2.2 Main PBA

Flash
Memory

OSC2
12MHz

USB2.0
Device

OSC6
12MHz

OSC4
25MHz

EEPROM
64Kbit

OSC5
12MHz

CHORUSm
Main Control
SoC

SDRAM

Network
Physical Chip

USB
Connector

RJ45

2.2.2.3 Main PBA Description

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│            ┌──────────────────┐      ┌──────────────┐             │
│            │  System Memory   │      │   EEPROM     │             │
│            │      SDRAM       │      │   64Kbit     │             │
│            │     128MB        │      └──────────────┘             │
│            └──────────────────┘                                   │
│                                                                   │
│  ┌──────────────┐        ┌──────────────────┐   ┌──────────────┐ │
│  │   USB2.0     │        │                  │   │   Engine     │ │
│  │   Device     │        │                  │   │   Control    │ │
│  └──────────────┘        │    CHORUSm       │   │  Interface   │ │
│                          │                  │   └──────────────┘ │
│  ┌──────────────┐        │                  │                    │
│  │ N/W Phyical  │        └──────────────────┘                    │
│  │    Chip      │                                                 │
│  └──────────────┘                                                 │
│            ┌──────────────────┐      ┌──────────────┐             │
│            │  FLASH Memory    │      │    OPE       │             │
│            │     4MB          │      │  Interface   │             │
│            └──────────────────┘      └──────────────┘             │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

1) CHORUSm

CHORUSm involves in itself the functions to control ARM Processor Core and various H/W devices. CHORUSm, therefore, controls Main PBA and all engine mechanism, processing the print job received from host and enabling the engine to print image.

≫ Function

▶ Process

· 0.13um Technology

▶ Package

· 496 PBGA

▶ CPU Core

· ARM 920T - 300MHz

· Cache : I-Cache 16KB, D-Cache 16KB

▶ System Bus

· 32-bit width, 100MHz

▶ SDRAM Controller

· 32-bit width, 100MHz operation

· 5 Banks, Up to 128MB Address space per Bank

· Programmable Timing to Control SDRAM A.C Characteristics

· Support Self Refresh for Data Retention

▶ ROM Controller

· 32-bit width, 4 Banks, Up to 16MB Address space per Bank

· Burst Capability

· Programmable Timing per Bank

- ▶ IO Controller
  - · 6 Channels, Up to 16MB Address space per Bank
  - · Programmable Timing per Bank
- ▶ DMA Controller
  - · 6 Channels General Purpose DMA
- ▶ HPVC Controller
  - · Hyper Printer Video Controller
  - · High Performance DMA-based Interface to Printer Engine
  - · Support Dual/Single Beam LSU, LVDS Video Output
  - · Support A3, 1200dpi
- ▶ UART Controller
  - · 5 Channels Indepenent Full Duplex UART
- ▶ Interrupt Controller
  - · Support 6 External Interrupts
  - · Support 26 Internal Interrupts
- ▶ Timer Controller
  - · 6 System Timers and Watch Dog Timer for S/W Trap
- ▶ Scanner Controller
  - · 300/400/600/1200dpi CIS/CCD Interface
  - · Color/Mono grey image, Binary image scan support
  - · 600dpi Color/Mono Copy support
  - · Image Processing for High-End MFP,Digital Copier
  - · MH/MR/MMR CODEC for Fax
  - · Scan image : A4 1200dpi processing
  - · Copy image : A4 600dpi processing
- ▶ MAC Controller
  - · 10/100Mbps
  - · Full IEEE 802.3 compatibility
- ▶ PPI Controller
  - · IEEE1284 compliant parallel port interface
  - · DMA-Based or Interrupt-Based operation
- ▶ GEU Controller
  - · Graphic Engine Unit for Banding support of Printer Language
  - · Scan Line Buffer, Polygon Filling
- ▶ CODEC Controller
  - · 2 Channels JBIG Encoding and Decoding
- ▶ I2C Controller
  - · 1 Channel, Operated at max frequency 400kHz
- ▶ RTC Controller
- ▶ Engine Controller
  - · LSU Control and Interface Unit
  - · 2 Channels STEP Motor Control Unit
  - · 8 Channels PWM Control Unit
  - · 8 Channels ADC Control Unit
  - · 2 Channels DAC Control Unit

■ CHORUSm (Internal Block Diagram)
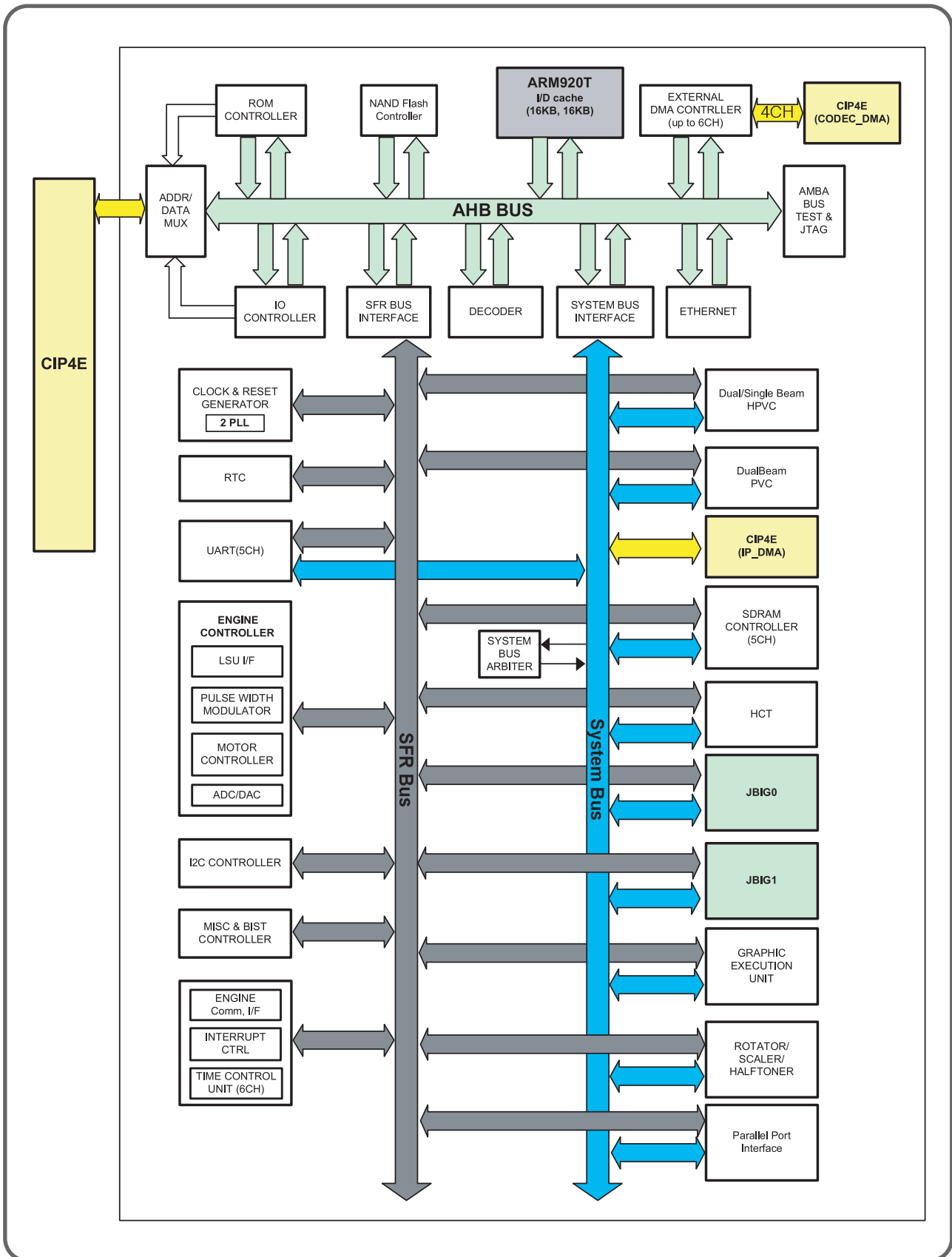
2) System Memory Block

Memory saves program and video data and print jobs received from host. Its volume is 64MB with network function and 32MB without network function. It has no separate device for extension. SDRAM is used, driven at width of 32-bit and 100MHz, and controlled by memory controller built in CHORUSm.

3) Flash Memory Block

Flash memory is the space used for saving program. Its volume is 4MB with network function and 2MB without network function. It has no separate device for extension. NOR type flash memory is used and accessed at 32-bit width burst, being controlled by the ROM controller built in CHORUSm.

4) USB2.0 Device Block

This block supports USB2.0 high speed (480Mbps). ISP1582 of Philips company is used and connected to the IO Bus of CHORUSm at 16-bit, controlled by IO controller built in CHORUSm. Through this I/O port it receives print job from host.

5) Network Block

This block has 10/100Mbps wired network function and is controlled by MAC controller built in CHORUSm. It is connected to host through physical layer chip outside, and thus receives print job from host. STE100P is used for physical layer chip.

6) EEPROM Block

System EEPROM is controlled by the I2C controller built in CHORUSm, connected to the other non-volatile memory on I2C bus. It works at the speed of 400KHz. This system EEPROM contains all drive information and production information necessary for the operation of printer. Its size is 16k-bit.

7) OPE Control

The panel is driven in the form of PIO by UART controller built in CHORUSm.

8) LSU Control

Laser Scanning Unit is controlled by LSU controller built in CHORUSm. It makes use of all functions such as Polygon Mirror Motor Control necessary for driving LSU and Synchronized Signal Generation Control, and helps to scan laser beam on the photosensitive drum to form latent image.

9) BLDC Control

It is controlled by BLDC controller built in CHORUSm. It controls the drive of printer mechanism and helps it to be driven at an equal speed.

10) Sensors Control

GPIO controller built in CHORUSm collects the status of all sensors. According to this status of sensors, it controls printer mechanism to help normal printing. There are sensors such as Paper Empty Sensor, Registration Sensor and Developer Home Sensor, etc.

11) Clutches Control

GPIO Controller built in CHORUSm controls all clutches, which help printer to do print job normally. There are clutches such as Paper Pick-up Clutch, Registration Clutch, Developer Home Clutch, ITB Clutch, T2 Clutch, Fuser Clutch, Developer Toner Supply Clutch, etc.

12) PWM Control

PWM Controller built in CHORUSm controls the parts that require PWM for normal printing, such as BLDC drive speed and HVPS high voltage level, etc.

13) ADC Control

It is controlled by ADC Controller built in CHORUSm, and is used for perception of charged voltage and current, 1st and 2nd transfer voltage and current, fusing temperature, used-up toner and toner amount, and interior temperature, etc.

14) DAC Control

It is controlled by DAC Controller built in CHORUSm and used to set standard level of light amount of LSU Laser Diode.

2.2.2.4 SMPS(Switching Mode Power Supply) PBA

SMPS is consisted of SMPS part which supplies DC power for driving system and AC Heat Control part which supplies power to Fuser. Standard TYPE III is used.
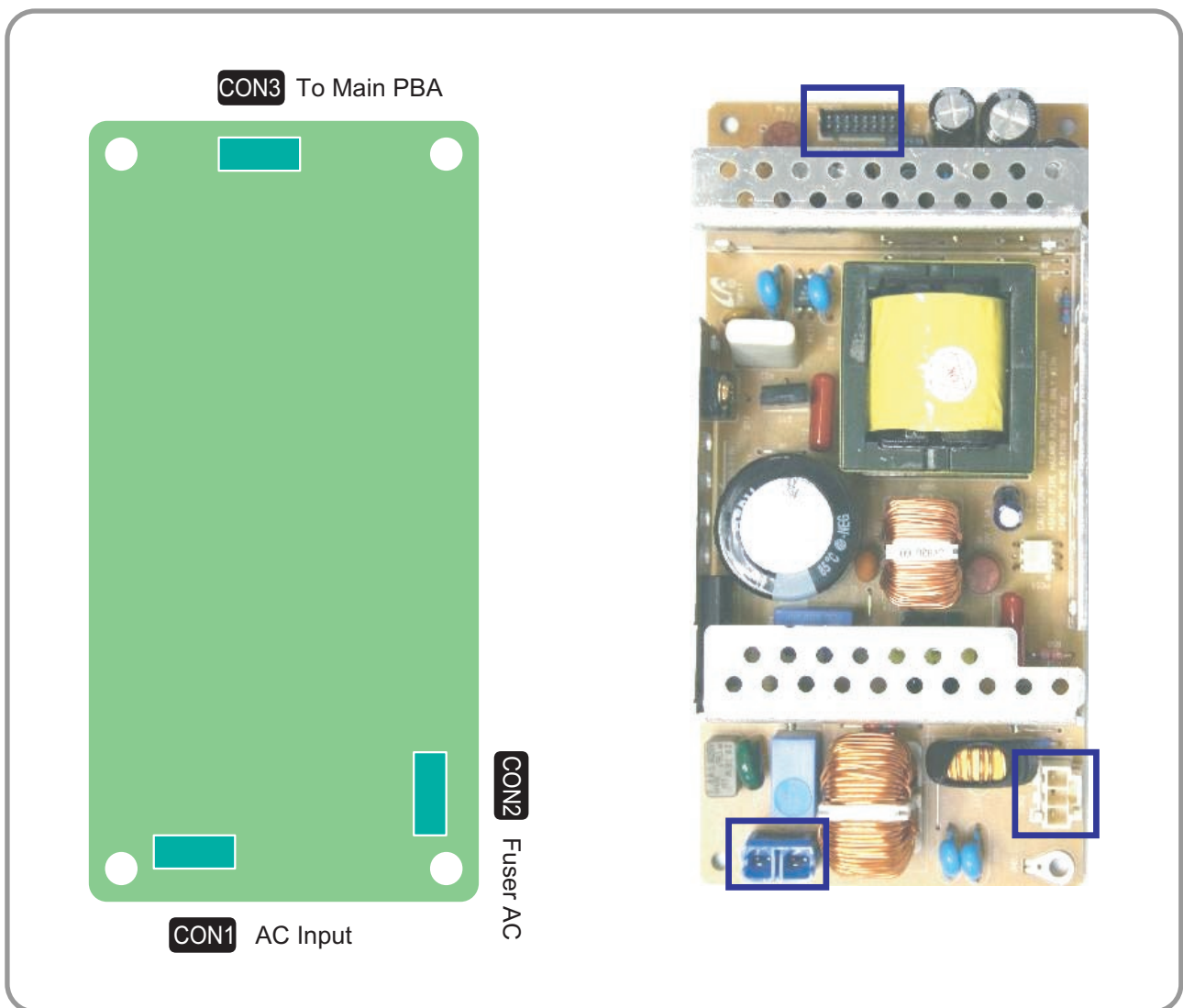
1) DC Output
· Main Controller PBA, OP Panel, BLDC, Sensors, Clutches, Other PBAs

2) AC Output
· Fuser Unit(Heat Lamp, Thermostat)

3) Output Voltage

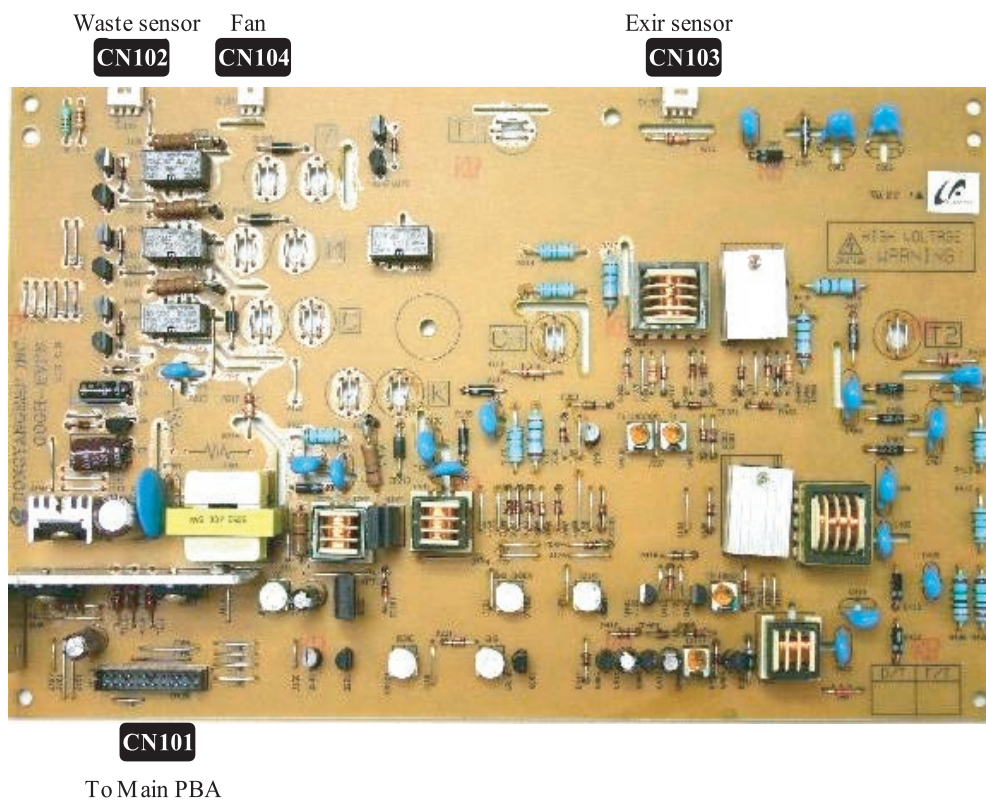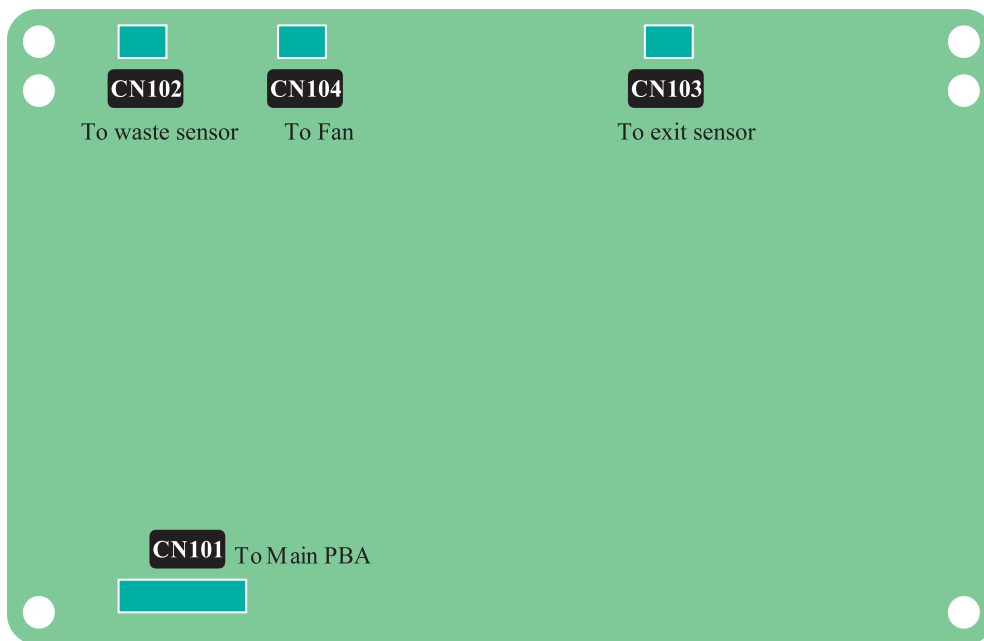| CHANNEL	+5.0V	+24V	+24VF
V_out	+5.0V +/-5%	+24.0V +15%/-10%	+24.0V +15%/-10%
Load	MicroController, CMOS, LOGIC	LSU	MOTOR, CLUTCH, HVPS

CON3 To Main PBA

CON2 Fuser AC

CON1 AC Input

2.2.2.5 HVPS(High Voltage Power Supply) PBA

HVPS PBA generates high voltage of charger, supply, T1 and T2 which is supplied to Developer, ensuring optimum condition for image formation. HVPS receives input of 24V and generates high voltage, supplying it to Toner, OPC, Cartridge, ITB Unit and Transfer Roller.

CN102 To waste sensor   **CN104** To Fan   **CN103** To exit sensor

CN101 To Main PBA

Waste sensor   Fan   Exir sensor
CN102   **CN104**   **CN103**

CN101

To Main PBA

1) Charger Voltage : Charger

· Function: voltage that charges OPC surface up to -500V~ -800V.

· Output voltage: -1.0KV ~ -2.0KV DC $\pm$ 3%

· Error type: if the voltage fails to be output to Charger Roll, OPC surface will not be charged, and the toner on the developer roller will be transferred to OPC Drum, printing black paper.

2) 1st Transfer High Voltage : T1(+)

· Function: voltage necessary for transferring toner developed on OPC Drum surface onto ITB.

· Output voltage: Max +2.0KV $\pm$ 3%(Duty variable, no load)

· ERROR type: if T1(+) output fails, the toner on OPC drum will not be transferred to ITB normally and the image will be blurred.

3) 2nd Transfer High Voltage : T2(+)

· Function: voltage used to transfer the toner primarily transferred on ITB again onto paper.

· Output voltage: Max +5.0KV $\pm$ 3%(Duty variable, no load)

· ERROR type: if T2(+) output fails, the toner on ITB will not be transferred to paper normally and the image will be blurred.

4) T2 Cleaning Voltage : Clean : T2(-)

· Function: prevent reverse side of paper from being dirtied, by recovering the negatively charged toner remaining at Transfer Roller and sending it onto ITB.

· Output voltage: with no feedback control, output fixed voltage(-1300V +/- 15%)

· ERROR type: reverse side of paper will be dirtied.

5) Supplying Voltage : Supply AC+DC(-)

· Function: voltage that makes toner to develop on the area exposed by LSU by means of potential difference, output will be the voltage of AC+DC overlapped form.

· Output voltage: AC 600V ~ 2000V p-p +/-1.5%

               DC -50V ~ -600V DC +/- 3%

· ERROR type: 1. if supply is GND, density will be extremely low.

               2. if supply is floating (for insecure terminal contact), density will be down so slightly that it is impossible to make out with naked eyes.

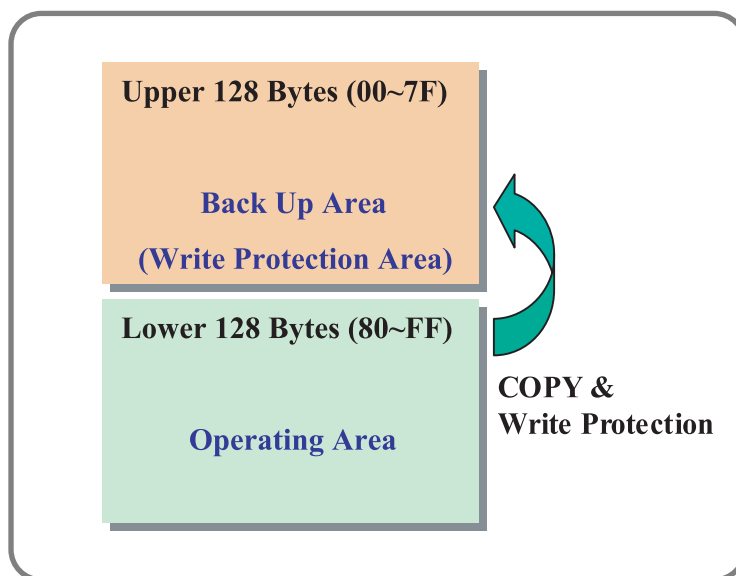## 6) Developing Voltage : Deve AC+DC(-)

· Function: voltage that supplies toner to Developing Roller

· Output voltage: AC 300V ~ 1700Vp-p $\pm$ 1.5% (supply voltage is connected to ZENER Diode 300V)

               DC -50V ~ -600V DC +/- 3%

· ERROR type: 1. if Deve is GND, density will be extremely down.

               2. if Deve is floating (for insecure terminal contact), density will be extremely down.

2.2.3 CRUM

■ **In the case of Refill Toner Install**

1) Perception of Refill Cartridge (when power is on or the cover is closed)
   End of Life / life span data initialization -> judge to be Refill Cartridge
   End of Life / life exhausted (simple refill) -> stop printing caused by life exhaustion

2) Operating

   It is impossible to control appropriate development parameters, for there's no toner specification data.
   It runs with the setting of default development parameter. (Image quality will be degraded, for the lack of appropriate respond to the change of time and environment.)

3) Service Response

   It is possible to response appropriately, for the information of cartridge life is saved at Back Up Area.

```
┌──────────────────────────────────────────────┐
│    ┌────────────────────────────┐             │
│    │  Upper 128 Bytes (00~7F)   │             │
│    │                            │             │
│    │      Back Up Area          │    ⟲        │
│    │  (Write Protection Area)   │             │
│    ├────────────────────────────┤             │
│    │  Lower 128 Bytes (80~FF)   │             │
│    │                            │  COPY &     │
│    │     Operating Area         │  Write Protection │
│    └────────────────────────────┘             │
└──────────────────────────────────────────────┘
```

■ **Process after CRU life expiration**

1) Record the information of End of Life.
2) Copy the information of Operating Area into Back up Area.
3) Write-Protect Back up Area.
4) Clear some information of Operation Area.
   -> Supplier/Model Name/MFC date/Serial Number (Manufacture Information)
   -> Let cartridge refiller initialize manufacture information and life span information.

■ CRUM Position
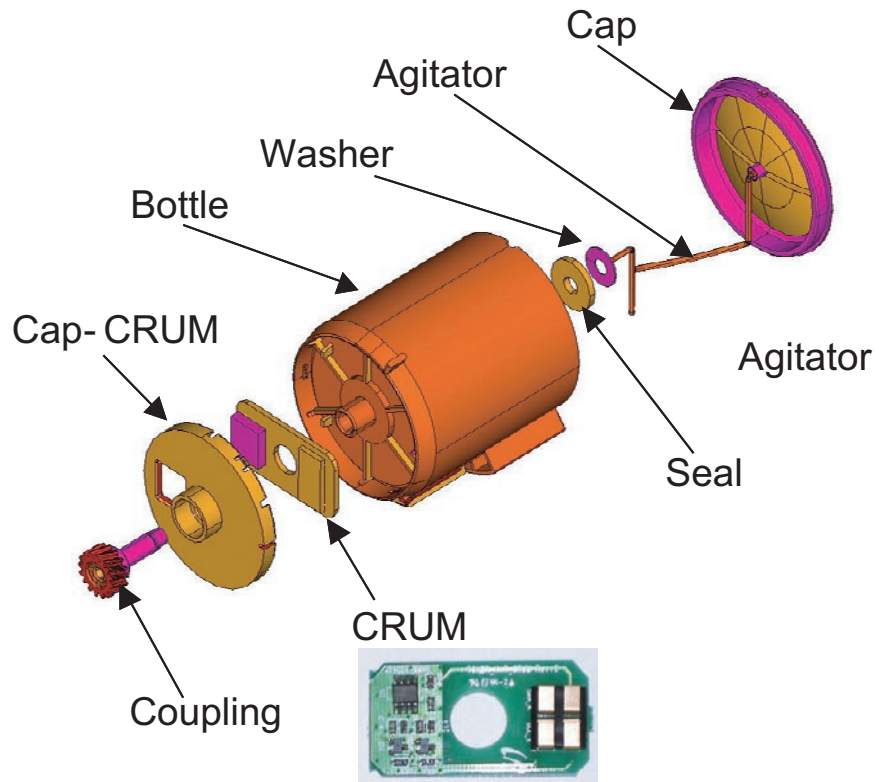
2.2.4 General Description

This chapter is the product specification for the CLX-3160FN Series. The CLX-3160FN Series is a Color Laser Printer. The CLX-3160FN Series series can be expanded to multi functional printer (MFP). CLX-3160FN Series is developed for two target users. Those are small office users who sometimes need color printouts, and medium business users who mainly use B/W printouts. The main product concept is "the world smallest and lightest color laser printer". This model has 16ppm B/W print-speed and 4ppm color print-speed, 2400 x 600 dpi class (optical 600 x 600 dpi) color laser printer.

2.2.4.1 Controller

-The video controller board is located on the right side of the printer.

-Basic Memory is 32 Mbytes SDRAM.

-Field F/W upgradeable FLASH ROM firmware for controller, 1024 byte EEPROM

-Printing Resolution :

  Native 600 x 600 dpi standard

  Resolution can be enhanced up to 2400 x 600 dpi class, 1200 x 600 dpi (default), 600 x 600 dpi

2.2.4.2 Processor

CHORUSm (300Mhz), Proprietary SOC

2.2.4.3 Printer Language Emulations

SPL-Color

2.2.4.4 Memory

The controller has 32 MB SDRAM and 4 MB flash ROM on Board.

2.2.4.5 Interfaces

The system supports the following standard interfaces:

· One USB port

- USB v.2.0 compliant

- Color-coded to meet WHQL requirements, connector must be Pantone 426C

· One 10/100 BaseT network connector

- The printer supports an internal Network Interface that can be installed pre-configured on the video controller board at the factory. This supports all of the major Network Operating Systems such as the Novell NetWare, TCP/IP, etc. Details of the network specification will be provided separately.

2.2.4.6 OP Panel

· 4in1 OP panel : FAX + COPY + SCAN + PRINTER)

· 3in1 OP panel : COPY + SCAN + PRINTER

· 16 x 2 LINE CHARACTER LCD

· MODE (FAX, COPY, SCAN)

· KEY TYPE: CARBON COATING S/W

2.2.4.7 Periodic Replacing Parts

Samsung shall specify parts requiring replacement and the frequency of replacement. The parts identified may be deemed customer replaceable parts. Periodic replacement parts shall be recommended as follows

Item(s)	Pages Printed	Part number
Black toner cartridge	Approx. 2,000 pages*	CLX-K3160A
Color toner cartridge	Approx. 1,000 pages*	CLX-C3160A:Cyan CLX-M3160A:Magenta CLX-Y3160A:Yellow
Imaging unit	Approx. 20,000 black pages or approx. 12,500 color pages	CLP-R300A
Waste toner container	Approx. 5,000 images** or Approx. 1,250 pages (fulll color Std. image)	CLP-W300A
Pick-up roller	Approx. 50,000 pages	Contact a service representative
Fuser unit	Approx. 100,000 black pages or 50,000 color pages	
T2 roller	Approx. 100,000 pages	
ITB	Approx. 60,000 black pages or 15,000 color pages	

* Average A4-/letter-sized page count based on Std. coverage of individual colors on each page. Usage conditions and print patterns may cause results to vary.

** Image counts based on one color on each page. If you print documents in full color (Cyan, Magenta, Yellow, Black), the life of this item will be reduced by 25%.

2.2.4.8 Power Switch

The Switch is located at rear-side of printer and must be marked to indicate on and off.

2.2.4.9 Operator Panel

(1) Configuration

Operations Panel uses Main Control and separated OPE Chip Micom and work as inner program,
systemic operation is serial system which exchange Date with SIO Port of Main Control. OPE Panel is approximately composed of Micom part, Matrix part and LCD.

(2) Micom controller

Micom has ROM, RAM, I/O Port built-in and displays and lights LCD by CPU command of Main Control Part and report Key recognition Data to Main Control Board.

2.2.4.10 Sensor

Paper empty (Cassette)

2.2.4.11 CRUMS

The CLX-3160 Series engine will be equipped with electronics that can read and write data into NVRAMs otherwise known as CRUMs that reside within 1) C, M, Y, K Toner cartridges and 2) Imaging kit(Developer, OPC, ITB). The CRUM has a company ID, and Samsunga electronics logo.

The toner CRUM also identifies the type of toner cartridge (Standard or High Capacity). The CRUMs contain fixed data such as the low warning point, specified life point, and hard stop point (on toner, not on IBT unit) and also store the current life count (pages count, pixels count, images count) and % of usage (gas gauge) data.

2.2.4.12 LOW / OUT Behavior for consumables

The consumable low and out behavior on CLX-3160 Series engine is specified by SEC.

FP message	Device for life end detection	Law(90%)	Life(100%)	Hard stop	Reset to 0
Toner	CRUM	Yes	Yes	Yes(115%)	No
Imaging Kit	CRUM	Yes	Yes	No	No
Fuser	No	Yes	Yes	No	Yes
T2 Roller	No	Yes	Yes	No	Yes
Pick-up	No	No	No	No	No